Information Request PESD-1

Please provide a map or description of the "Business Districts" as defined in 220 C.M.R. § 101.06(21)(a) for the Town of Hopkinton.

Response

Please see Attachments PESD-1(a) and PESD-1(b), which are maps of the three "Business Districts" within the Town of Hopkinton. These districts include:

(1) The area of Main Street (Route 135) at Church Street, encompassing: (a) Main Street from Church Street to Ash Street; (b) Ash Street from Main Street to Park Street; (c) Hayden Rowe Street from Main Street to Price Street; and (d) Church Street from Main Street to Price Street (shown in green on Att. PESD-1(a)).

(2) The area of West Main Street near Lumber Street from Main Street West and along a 200-foot portion in front of the mini-mall (shown in blue on Att. PESD-1(b)).

(3) The area of Cedar Street (Route 85) and Main Street, including 200 feet on Cedar Street both north and south of Main Street and 350 feet on Main Street east and west of Cedar Street (shown in red on Att. PESD-1(b)).

BULK ATTACHMENT

Information Request PESD-2

Please provide any and all documents recording or memorializing any visits by NSTAR Gas Company personnel or contractor personnel to 65 Main Street, Hopkinton between and including the date gas service was first provided to the building and July 24, 2002.

Response

Attachment PESD-2 includes the following documents dated June 30, 1947 through July 24, 2002:

1. June 30, 1947 (service installation);
2. September 28, 1973 (service repair);
3. October 8, 1974 (two entries for plastic insert);
4. October 25, 1979 (installation of plastic tie-over);
5. June 1, 2001 (repair leak at dryer hose);
6. January 10, 2002 (Walking Survey);
7. February 22, 2002 (7-year meter exchange);
8. March 6, 2002 (7-year meter exchange and respond to gas odor call);
9. March 12, 2002 (7-year meter exchange);
10. May 23, 2002 (two 7-year meter exchanges);
11. May 24, 2002 (turn on and light up after meter exchange);
12. June 4, 2002 (shut off for non-payment);
13. June 5, 2002 (turn on after shut off for non-payment);
14. July 2, 2002 (Mobile Survey);
15. July 15, 2002 (Business District Survey); and
16. July 24, 2002 (incident response).

Attachment
PESD-2

Street & No. 79 Main St. Hopk. Tax District Hopkinton Service Order No. 3465

Name Owner Francis J. Hayward

Address Owner 79 Main St. Hopk. R.I. C.O. 75566

Name Occupant Francis J. Hayward W.O. 62779

Date 6/30/47 19

Service New [X] Relay [ ]

COST SUMMARY	Public	Private
Material		
Labor		
Car Checks		
Auto		
Compressor		
Total Direct		

SERVICE DATA

Main-to-St. Line 12 Ft. In.

St. Line to Bldg. 10 Ft. In.

Total 22 Ft. In.

CHARGE CUSTOMER

Min. Charge

Excess Ft. Hourly

Amount

Abandoned: Ft. @

GAS MATERIAL	Size or Number	Private Property	Public Property	Cost Unit	Cost Private Property	Cost Public Property
Pipe Ft.	1"		22			
"						
Caps	1"		2			
Elbows						
"						
Gate Mexo Cock	1"		1			
Box	"		1			
Stop Cock Low	1"		1			
Plugs	3/4x2					
"						
Nipples	1x2		2			
"						
Tees Welded	1"		1			
"	1"		1			
Unions						
Lead pipe	5"		3			
TOTALS	—	—	—			

OBSOLETE INFO THIS MAIN ON

BILLED NOTED ON PLATE 8/6/47

HK01837

Form CA21C

Service from 2" Main on Main St. COMPLETED July 15 1947 By Cirino

LABOR RECORD

	Rate	Public Property HRS.	HRS.	HRS.	HRS.	TOTAL HRS.	Amount	Private Property HRS.	HRS.	HRS.	HRS.	TOTAL HRS.	Amount
Francis						8							
Cirino						6							
Lepore						8							
Johnson						8							
Vitali						6							
Total Labor						36							
Auto 6003 4850						6							
Compressor													
Car Checks													
Total													

SUPPLY DATA

Factory [ ]

Business Block [ ]

Family House [X] 2

Cover on Main 3

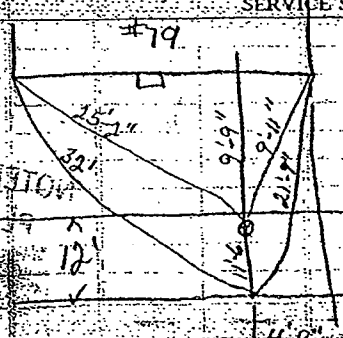
Kind of Pavement Gravel

Kind of Digging Gravel

Condition of Main Good

Remarks drips & mains

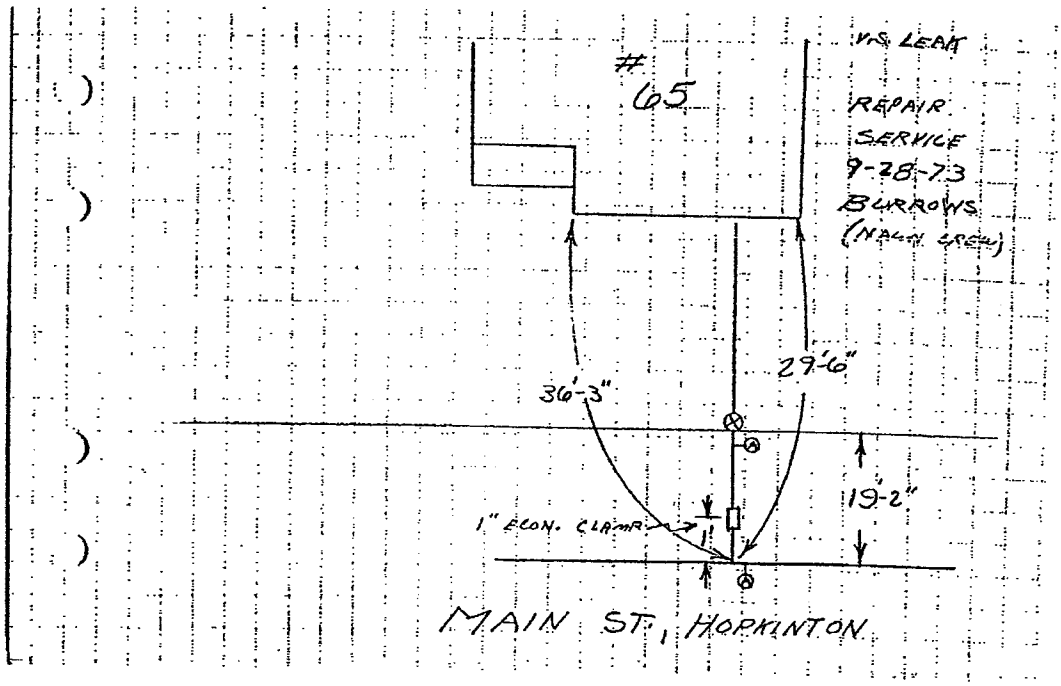
SERVICE SKETCH



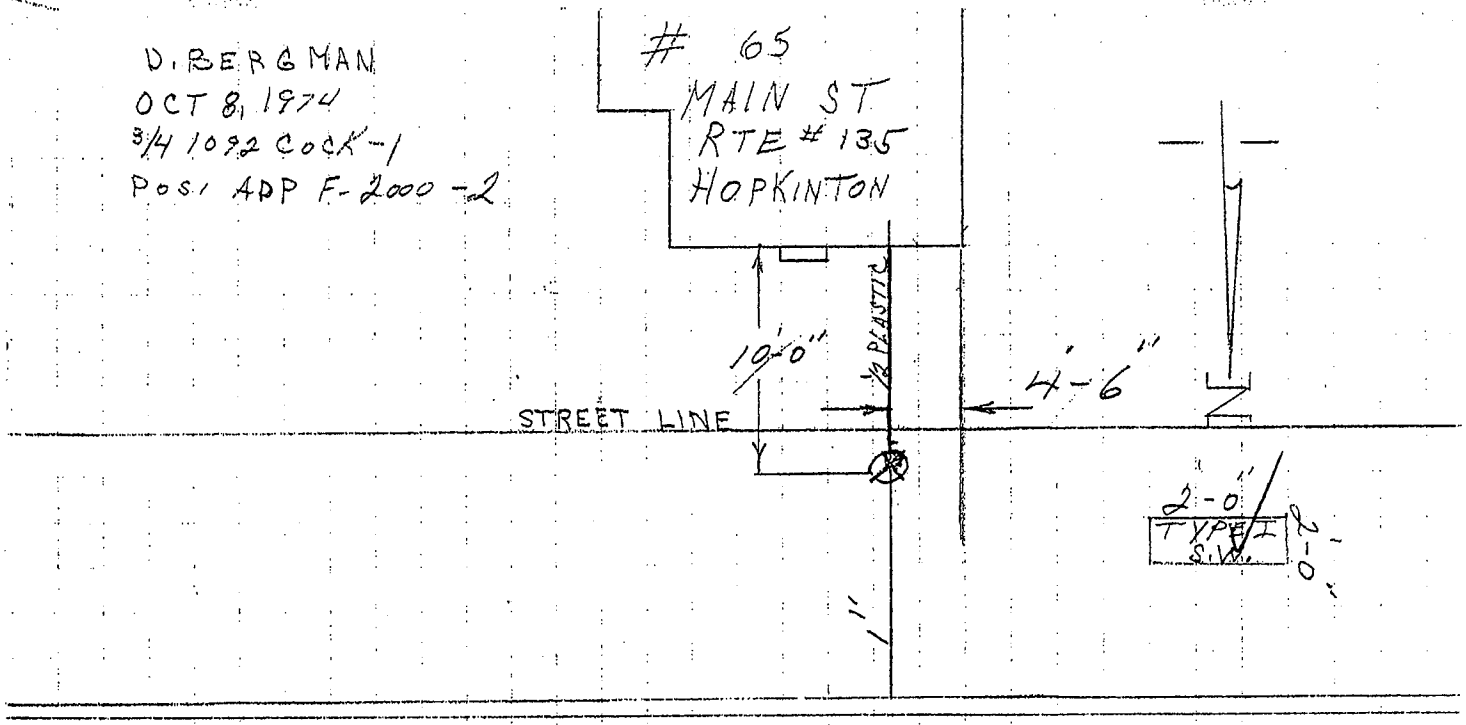
OBSOLETE INFO THIS MAIN ON Engine 1987

BILLED NOTED ON PLATE

00001

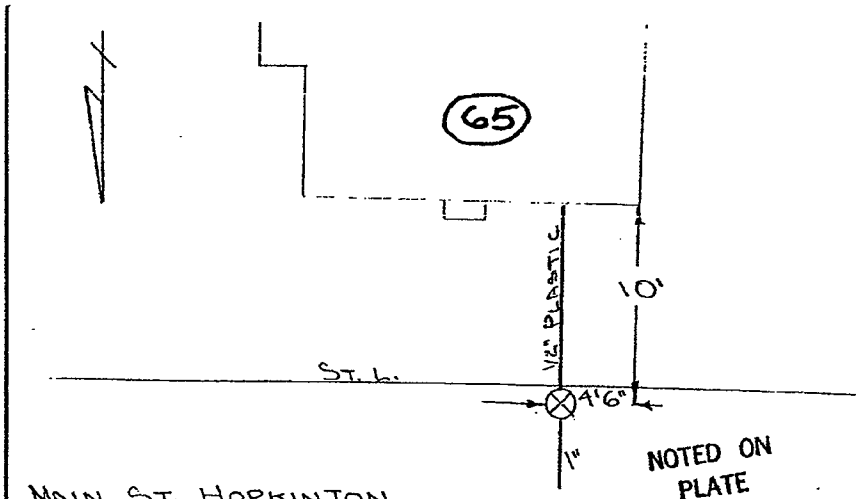

#
65
W.S. LEAK
REPAIR
SERVICE
9-28-73
BURROWS
(MAIN CREW)
36'-3"
29'-6"
19'-2"
1" ECON. CLAMP
MAIN ST., HOPKINTON

D. BERGMAN
OCT 8, 1974
3/4 1092 COCK-1
POS-I ADP F-2000-2



Sketched
12-7-74

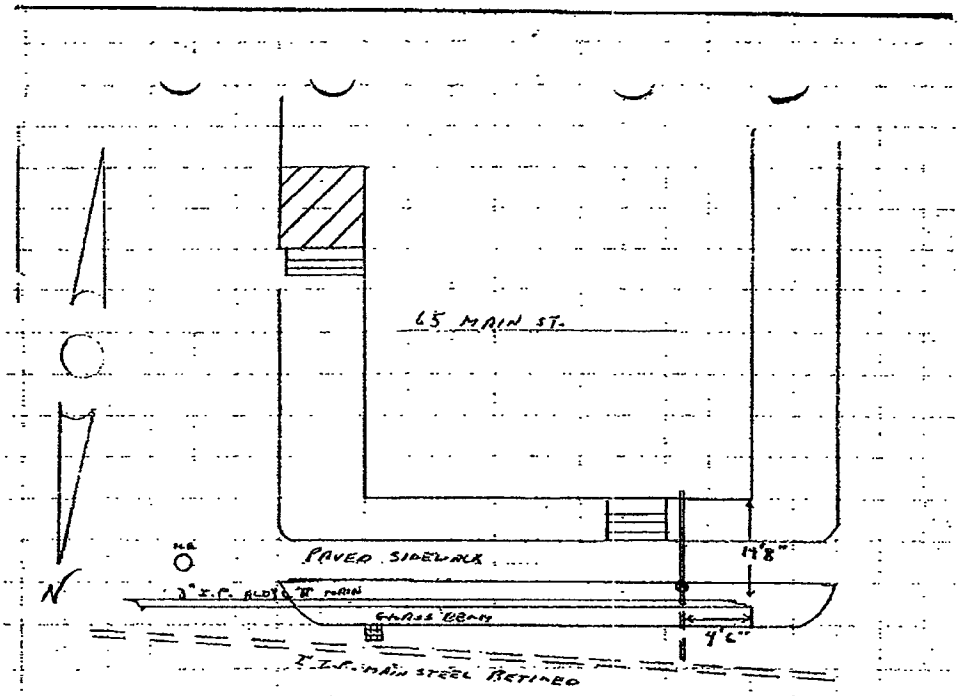
00003



1/2" PLASTIC RELAY C.C. TO WALL.
BERGMAN 10-8-'74

HK01819

00004



NOTED ON PLATE

HK01820

ST. 65 MAIN ST. TOWN HOPKINTON
JOB ½" PLASTIC TIE OVER OF EXISTING ½" INSERT
DATE 10-25-78 BY DE CARLO - DEJESERUS

OD 154

00005

ORDER NO.: ~~9 9 9 0 2 4 7 5 5~~ 010 272545

NSTAR GAS **20a**

COMMITTED TO SERVING THE CUSTOMER AND THE COMMUNITY

1-800-572-9300

[AC]COUNT NO:	
[NAM]E: Carney	PHONE:
[ADDRE]SS: 65 MAIN ST	APT.:
TOWN/ZIP: Hopkinton	

BILLING ADDRESS:

ACCOUNT NO:	
NAME:	PHONE:
ADDRESS:	APT.:
TOWN/ZIP:	
PREVIOUS STOP TIME:	AM PM

WORK STATUS

CHARGE	✓	METER WORK	
WARRANTY		ODOR INVEST.	
NO CHARGE		COMPLETE	
RECALL		INCOMPLETE	
ODOR DETECTED:		YES	NO

SERVICE DATE: 6/1/01	START: AM PM	STOP: AM PM	AREA/FUNC. 15-2213
PERFORMED BY: cp	START: AM PM	STOP: AM PM	AREA/FUNC.

DESCRIPTION OF WORK PERFORMED: Repaired leak at flex Hose on Dryer Dryer has plastic vent ~~red tagged same~~

QTY	STOCK CODE	DESCRIPTION OF MATERIALS	UNIT PRICE	AMOUNT $

LABOR CALC.:	$/HR	LABOR $		
1st 15 min.			TOTAL MATERIAL	
Add'l ______			SALES TAX	
			TOTAL LABOR	
SR / OTHER DISCOUNT ☐ Yes ☐ No	FLAT RATE $	QTY	FLAT RATE ODOR	
			FLAT RATE PUMP	
			TOTAL BILLING	85

CUSTOMER SIGNATURE
X [signature]

PAYMENT: ☐ MASTERCARD/VISA ☐ BILL ME

MasterCard/Visa # ______________________ Exp. Date __/__

MAINTENANCE CONTRACT CUSTOMERS ONLY (If applicable):
I hereby acknowledge receipt of notification from Commonwealth Gas Company that the heating / hot water equipment identified below and installed at the above service address does not qualify for coverage under the Home Heating Protection Plan for the following reason(s): ____ Sized to large ____ Poor condition ____ Type not covered. I further acknowledge that, until such time as the equipment is deemed acceptable by Commonwealth Gas Company, all requested service on such equipment will be chargeable at the current standard rates for both parts and labor.

Appliance: ________ Make: ________ Model: ________ Serial #: ________

CUSTOMER SIGNATURE: ____________________ DATE: ________

COMPONENTS CHECKED/ADJUSTED

[illegible]		[illegible]	
MAIN BURNERS		[illegible]	
[illegible]		[illegible]	
[illegible]		BLOWER MOTOR	
GAS VALVE		[illegible]	
THERMOSTAT		FAN HOUSING	
FLUE PIPE		AIR FILTER	
DRAFT		[illegible]	
MODULE		[illegible]	
TRANSFORMER		[illegible]	
VENT DAMPER		[illegible]	
[illegible]		[illegible]	
[illegible] HOT WATER [illegible]		[illegible] STEAM	
AQUASTAT		PRESSURE TROL	
PRESSURE GAUGE		PRESSURE GAUGE	
EXPANSION TANK		GAUGE GLASS	
CIRC PUMP		LOW WATER CUTOFF	
ZONE VALVES		SWITCH LWCO	
PRESSURE RELIEF		PRESSURE RELIEF	

[MET]ER INVESTIGATION:	EXISTING METER NO.	READ	NEW METER NO.	READ	ERT NO.
[illegible]	[illegible]	[illegible]	EXCHANGE	REMOVE	SET

FORM: RO-1 CAT ID 13768 REV. 2/01

OFFICE COPY

00006

COM/GAS - ANNUAL WALKING SURVEY - 2001

TOWN: HOPKINTON
STREET: MAIN

ZIP IF USED: ____
ST

DATE 1/10/02
TECHNICIAN Dave Peacock

HOUSE #	RESULTS POS	RESULTS NEG	METER PROTECTED Y/N	CUST NAME
2		✓	Y	HOPKINTON TOWN HALL
6		✓	Y	KOREAN PRESBYTERIAN
10		✓	Y	HOPKINTON ACACIA CLB
13		✓	Y	MIDDLESEX SAVINGS BA
14		✓	Y	HOPKINTON LIBRARY
15		✓	Y	BILL'S PIZZA & RESTA
17		✓	Y	EISELE
25		✓	Y	STATEWIDE REALTY MGM
28		✓	Y	25 MAIN ST REALTY TR
34		✓	Y	CTRNG CON CLASSE BY
35		✓	Y	KEEFE
42		✓	Y	35 MAIN ST REALTY
45		✓	Y	VACANT CUSTOMER
46		✓	Y	CARVER
59		✓	Y	HOPKINTON DRUG
61		✓	Y	STRATA BANK
63		✓	Y	COLELLAS MARKET INC
65		✓	Y	HITCHINGS
66		✓	Y	MAIN S
67		✓	Y	SOVEREIGN BANK
70		✓	Y	WARD
73		✓	Y	MARSO
74	✓		Y	HOPKINTON FIRE STATI
75		✓	Y	HOPKINTON POLICE
76		✓	Y	VACANT CUSTOMER
77		✓	Y	APEAL REALTY
78		✓	Y	THOMSON REALTY LP
79		✓	Y	HELLBERG
81		✓	Y	VACANT CUSTOMER
82		✓	Y	VACANT CUSTOMER
84		✓	Y	MAGNABB
86		✓	Y	CLEERE
87		✓	Y	HARRIS
88		✓	Y	PALMER
89		✓	Y	GREENE
90		✓	Y	LITCHFORD
91		✓	Y	SHANE
92		✓	Y	VACANT CUSTOMER
93		✓	Y	DUFFY
97		✓	Y	KIMBALL
101		✓	Y	HILLERS CLEANERS
103		✓	Y	SCARLATA
105		✓	Y	GATELY
107		✓	Y	GENESIS 1 CORP

20000

ORDER NO.: 0202965211 FEB 27 2002

NSTAR GAS

COMMITTED TO SERVING THE CUSTOMER AND THE COMMUNITY

1-800-572-9300

ACCOUNT NO:

NAME: D.Debreitas PHONE:

ADDRESS: 65 Main ST APT.: 3RD

TOWN/ZIP: Hopkinton

BILLING ADDRESS:

ACCOUNT NO:

NAME: PHONE:

ADDRESS: APT.:

TOWN/ZIP:

PREVIOUS STOP TIME: AM PM

WORK STATUS			
CHARGE		METER WORK	
WARRANTY		ODOR INVEST.	
NO CHARGE		COMPLETE	
RECALL		INCOMPLETE	
ODOR DETECTED:		YES	NO

SERVICE DATE: 2.22.02 START: 220 AM PM STOP: 240 AM PM AREA/FUNC: 15-2608

PERFORMED BY: 20 START: AM PM STOP: AM PM AREA/FUNC.

DESCRIPTION OF WORK PERFORMED

74X Relit

QTY	STOCK CODE	DESCRIPTION OF MATERIALS	UNIT PRICE	AMOUNT $

LABOR CALC.:	$/HR	LABOR $	TOTAL MATERIAL	
1st 15 min.			SALES TAX	
Add'l			TOTAL LABOR	
SR / OTHER DISCOUNT	FLAT RATE $	QTY	FLAT RATE ODOR	
☐ Yes ☐ No			FLAT RATE PUMP	
CUSTOMER SIGNATURE X			TOTAL BILLING	

PAYMENT: ☐ MASTERCARD/VISA ☐ BILL ME

MasterCard/Visa # _____ Exp. Date ___/___

COMPONENTS CHECKED/ADJUSTED			
GENERAL		WARM AIR	
MAN GAUGES		FAN CONTROL	
BURNER		LIMIT CONTROL	
RELAY		BLOWER/MOTOR	
GAS VALVE		PULLEY/BELT	
THERMOSTAT		FAN HOUSING	
FLUE PIPE		AIR FILTER	
CHIMNEY			
MODULE			
TRANSFORMER			
VENT DAMPER			
DIVERTER			
HOT WATER		STEAM	
AQUASTAT		PRESSURETROL	
PRESSURE GAUGE		PRESSURE GAUGE	
EXPANSION TANK		GAUGE GLASS	
CIRC. PUMP		LOW WATER CUTOFF	
ZONE VALVES		SWITCH/LWCO	
PRESSURE RELIEF		PRESSURE RELIEF	

MAINTENANCE CONTRACT CUSTOMERS ONLY (if applicable):

I hereby acknowledge receipt of notification from NSTAR Gas that the heating / hot water equipment identified below and installed at the above service address does not qualify for coverage under the Home Heating Protection Plan for the following reasons: ___ Sized to large ___ Poor condition ___ Type not covered. I further acknowledge that, until such time as the equipment is deemed acceptable by NSTAR Gas, all requested service on such equipment will be chargeable at the current standard rates for both parts and labor.

Appliance: _____ Make: _____ Model: _____ Serial #: _____

CUSTOMER SIGNATURE: DATE: 1019

METER INVESTIGATION:	EXISTING METER NO:	READ	NEW METER NO:	READ	ERT NO:
	R0200009	1019	W0009765	6857	

SA	COMMENT/RED TAG NO.	METER LOC.	PLEASE CIRCLE	SHUT OFF / TURN ON	EXCHANGE	REMOVE	SET
		C		CH (WH)	RG DR	SH KH	OTH

FORM: RO-1 CAT ID 13766 REV 7/01

OFFICE COPY

00008

ORDER NO.: 0203-5577

NSTAR GAS

COMMITTED TO SERVING THE CUSTOMER AND THE COMMUNITY

1-800-572-9300

ACCOUNT NO:

NAME: PHONE:

ADDRESS: 65 MAIN ST APT.:

TOWN/ZIP: HOPK

BILLING ADDRESS:

ACCOUNT NO:

NAME: PHONE:

ADDRESS: APT.:

TOWN/ZIP:

PREVIOUS STOP TIME: AM PM

WORK STATUS			
CHARGE		METER WORK	
WARRANTY		ODOR INVEST.	
NO CHARGE	X	COMPLETE	X
RECALL		INCOMPLETE	
ODOR DETECTED:		YES X NO	

SERVICE DATE: 3/6/02 START: 430 AM PM STOP: 5:00 AM PM AREA/FUNC. 15-2025

PERFORMED BY: 13 START: AM PM STOP: AM PM AREA/FUNC.

DESCRIPTION OF WORK PERFORMED

✓ INSIDE & OUTSIDE

QTY	STOCK CODE	DESCRIPTION OF MATERIALS	UNIT PRICE	AMOUNT $	

LABOR CALC.:	$/HR		LABOR $		TOTAL MATERIAL
1st 15 min.					SALES TAX
Add'l					TOTAL LABOR
SR / OTHER DISCOUNT ☐ Yes ☐ No	FLAT RATE $		QTY		FLAT RATE ODOR
					FLAT-RATE PUMP
CUSTOMER SIGNATURE X					TOTAL BILLING

PAYMENT: ☐ MASTERCARD/VISA ☐ BILL ME

MasterCard/Visa # _____ Exp. Date ___/___

MAINTENANCE CONTRACT CUSTOMERS ONLY (if applicable):

I hereby acknowledge receipt of notification from NSTAR Gas that the heating / hot water equipment identified below and installed at the above service address does not qualify for coverage under the Home Heating Protection Plan for the following reasons: ___ Sized for large ___ Poor condition ___ Type not covered. I further acknowledge that, until such time as the equipment is deemed acceptable by NSTAR Gas, all requested service on such equipment will be chargeable at the current standard rates for both parts and labor.

Appliance: _____ Make: _____ Model: _____ Serial #: _____

CUSTOMER SIGNATURE: DATE:

COMPONENTS CHECKED / ADJUSTED			
GENERAL		WARM AIR	
MAIN BURNER		FAN CONTROL	
PILOT		LIMIT CONTROL	
RELAY		BLOWER MOTOR	
GAS VALVE		PULLEY/BELT	
THERMOSTAT		FAN HOUSING	
FLUE PIPE		AIR FILTER	
DRAFT			
MODULE			
TRANSFORMER			
VENT DAMPER			
DIVERTER			
HOT WATER		STEAM	
AQUASTAT		PRESSURETROL	
PRESSURE GAUGE		PRESSURE GAUGE	
EXPANSION TANK		GAUGE GLASS	
CIRC. PUMP		LOW WATER CUTOFF	
ZONE VALVES		PROBE/LWCO	
PRESSURE RELIEF		PRESSURE RELIEF	

METER INVESTIGATION:	EXISTING METER NO.:	READ	NEW METER NO.:	READ	ERT NO.:
SAFETY COMMENT/RED TAGE NO.:	METER LOC.:	PLEASE CIRCLE:	SHUT OFF / TURN ON	EXCHANGE CH WH RG DB	REMOVE SH KH SET OTH

RO-1 CAT ID 13768

REV 7/01

OFFICE COPY

00009

ORDER NO.: 0203551519

MAR 15 2002

NSTAR GAS

COMMITTED TO SERVING THE CUSTOMER AND THE COMMUNITY.

1-800-572-9300

ACCOUNT NO:

NAME: Carey PHONE:

ADDRESS: 65 Main ST APT.: 2ND L

TOWN/ZIP: Hopkinton

BILLING ADDRESS:

ACCOUNT NO:

NAME: PHONE:

ADDRESS: APT.:

TOWN/ZIP:

PREVIOUS STOP TIME: AM PM

WORK STATUS			
CHARGE		METER WORK	
WARRANTY		ODOR INVEST.	
NO CHARGE		COMPLETE	
RECALL		INCOMPLETE	
ODOR DETECTED:	YES	NO	

SERVICE DATE: 3/6/02 START: 245 AM PM STOP: 315 AM PM AREA/FUNC.: 15-2605

PERFORMED BY: 20 START: AM PM STOP: AM PM AREA/FUNC.:

DESCRIPTION OF WORK PERFORMED

744

QTY	STOCK CODE	DESCRIPTION OF MATERIALS	UNIT PRICE	AMOUNT $

LABOR CALC.:	$/HR	LABOR $	TOTAL MATERIAL	
1st 15 min.			SALES TAX	
Add'l			TOTAL LABOR	
SR / OTHER DISCOUNT	FLAT RATE $	QTY	FLAT RATE ODOR	
☐ Yes ☐ No			FLAT RATE PUMP	
CUSTOMER SIGNATURE X			TOTAL BILLING	

PAYMENT: ☐ MASTERCARD/VISA ☐ BILL ME

MasterCard/Visa # _____ Exp. Date ___/___

COMPONENTS CHECKED / ADJUSTED	
IGNITER	WARM AIR
BURNER	FAN CONTROL
PILOT	LIMIT CONTROL
THERMOCOUPLE	BLOWER MOTOR
GAS VALVE	BELT / PULLEY
THERMOSTAT	FAN HOUSING
FUSE/FILTER	AIR FILTER
DRAFT	
MODULE	
TRANSFORMER	
VENT DAMPER	
INVERTER	
HOT WATER	STEAM
AQUASTAT	PRESSURETROL
PRESSURE GAUGE	PRESSURE GAUGE
EXPANSION TANK	GAUGE GLASS
CIRC PUMP	LOW WATER CUTOFF
ZONE VALVES	SWITCH LWCO
PRESSURE RELIEF	PRESSURE RELIEF

MAINTENANCE CONTRACT CUSTOMERS ONLY (If applicable):

I hereby acknowledge receipt of notification from NSTAR Gas that the heating / hot water equipment identified below and installed at the above service address does not qualify for coverage under the Home Heating Protection Plan for the following reasons: ___ Sized to large ___ Poor condition ___ Type not covered. I further acknowledge that, until such time as the equipment is deemed acceptable by NSTAR Gas, all requested service on such equipment will be chargeable at the current standard rates for both parts and labor

Appliance: ___ Make: _____ Model: _____ Serial #: _____

CUSTOMER SIGNATURE: DATE:

METER INVESTIGATION:	EXISTING METER NO.	READ	NEW METER NO.	READ	ERT NO.
	13427187	01768	00255971	74961	

SAFETY COMMENT/RED TAG NO.	METER LOC.	PLEASE CIRCLE: SHUT OFF / TURN ON	EXCHANGE	REMOVE	SET
			CH AWH RG DR	SH KH	OTH

WE RO-1 CAT ID 13760 REV 7/01

OFFICE COPY

00010

GAS LEAK TEMPORARY ORDER

Name Carey Order # 020355717

Address 65 Main St 2L Meter #

Town Hopkinton Zip Grid #

Tel. # 544-8208 Degree of Odor: Faint ☐ Medium ☐ Strong ☐

Location In front of house

Length of Time Since Noticed

Comments

For Dispatcher Use Only

Dispatcher CW

Assigned to unit 13

Time 354

Other Notifications 430

Unit Time

Unit Time

IMPORTANT: Have you verified — Name — Address — Town — Zip — Phone # — ? Yes ☐ No ☐

Date 3/6 Time 352 Operator Tina

CD 435 CG CAT ID 13587 Rev. 7/97

00011

20d

ORDER NO.: 0203-82866

MAR 18 2002 / MAR 19 2002

NSTAR GAS
COMMITTED TO SERVING THE CUSTOMER AND THE COMMUNITY
1-800-572-9300

ACCOUNT NO:
NAME: Webster PHONE:
ADDRESS: 65 Main ST APT.: 1
TOWN/ZIP: Hopkinton

BILLING ADDRESS:
ACCOUNT NO:
NAME: PHONE:
ADDRESS: APT.:
TOWN/ZIP:

WORK STATUS			
CHARGE		METER WORK	
WARRANTY		ODOR INVEST.	
NO CHARGE		COMPLETE	
RECALL		INCOMPLETE	
ODOR DETECTED:		YES	NO

PREVIOUS STOP TIME: AM PM

SERVICE DATE: 3/12/02 START: 12:40 AM PM STOP: 1:10 AM PM AREA/FUNC. 5-2608
PERFORMED BY: 20 START: AM PM STOP: AM PM AREA/FUNC.

DESCRIPTION OF WORK PERFORMED
7YX

QTY	STOCK CODE	DESCRIPTION OF MATERIALS	UNIT PRICE	AMOUNT $

LABOR CALC.:	$/HR	LABOR $	TOTAL MATERIAL	
1st 15 min.			SALES TAX	
Add'l ______			TOTAL LABOR	
SR / OTHER DISCOUNT	FLAT RATE $	QTY	FLAT RATE ODOR	
☐ Yes ☐ No			FLAT RATE PUMP	
CUSTOMER SIGNATURE X			TOTAL BILLING	

PAYMENT: ☐ MASTERCARD/VISA ☐ BILL ME
MasterCard/Visa # ____________________ Exp. Date ___/___

COMPONENTS CHECKED / ADJUSTED

GENERAL		WARM AIR	
MAIN BURNER		FAN CONTROL	
PILOT		LIMIT CONTROL	
RELAY		BLOWER MOTOR	
GAS VALVE		PULLEY/BELT	
THERMOSTAT		FAN HOUSING	
FLUE PIPE		AIR FILTER	
DRAFT			
MODULE			
TRANSFORMER			
VENT DAMPER			
DIVERTER			
HOT WATER		STEAM	
AQUASTAT		PRESSURETROL	
PRESSURE GAUGE		PRESSURE GAUGE	
EXPANSION TANK		GAUGE GLASS	
CIRC. PUMP		LOW WATER CUTOFF	
ZONE VALVES		SWITCH LWCO	
PRESSURE RELIEF		PRESSURE RELIEF	

MAINTENANCE CONTRACT CUSTOMERS ONLY (if applicable):
I hereby acknowledge receipt of notification from NSTAR Gas that the heating / hot water equipment identified below and installed at the above service address does not qualify for coverage under the Home Heating Protection Plan for the following reasons: ___ Sized to large ___ Poor condition ___ Type not covered. I further acknowledge that, until such time as the equipment is deemed acceptable by NSTAR Gas all requested service on such equipment will be chargeable at the current standard rates for both parts and labor.
Appliance: ______ Make: ______ Model: ______ Serial #: ______
CUSTOMER SIGNATURE: DATE:

METER INVESTIGATION:	EXISTING METER NO.	READ	NEW METER NO.	READ	ERT NO.
	P045673	045	M002220	6525	

SAI	COMMENT/RED TAG NO.	METER LOC.	PLEASE CIRCLE:	SHUT OFF / TURN ON	EXCHANGE	REMOVE	SET
				CH (WH) (RG) DR SH KH OTH			

4 RO-1 CAT ID 13768 REV 7/01

OFFICE COPY

ORDER NO.: 0 2 0 7 5 3 6 7 6

20f

NSTAR GAS

JUL 05 2002

COMMITTED TO SERVING THE CUSTOMER AND THE COMMUNITY

1-800-572-9300

ACCOUNT NO:

NAME: PHONE:

ADDRESS: 65 Main ST APT.: 2C

TOWN/ZIP: Hopkinton

BILLING ADDRESS:

ACCOUNT NO:

NAME: PHONE:

ADDRESS: APT.:

TOWN/ZIP:

PREVIOUS STOP TIME: AM PM

WORK STATUS			
CHARGE		METER WORK	
WARRANTY		ODOR INVEST.	
NO CHARGE		COMPLETE	
RECALL		INCOMPLETE	
ODOR DETECTED:		YES	NO

SERVICE DATE: 5 23, 02 START: 1120 AM PM STOP: 1145 AM PM AREA/FUNC. 15-2608

PERFORMED BY: 20 START: AM PM STOP: AM PM AREA/FUNC.

DESCRIPTION OF WORK PERFORMED

74X S/O cgI left card

QTY	STOCK CODE	DESCRIPTION OF MATERIALS	UNIT PRICE	AMOUNT $

LABOR CALC.:	$/HR	LABOR $	TOTAL MATERIAL	
1st 15 min.			SALES TAX	
Add'l ______			TOTAL LABOR	
SR / OTHER DISCOUNT	FLAT RATE $	QTY	FLAT RATE ODOR	
☐ Yes ☐ No			FLAT RATE PUMP	
CUSTOMER SIGNATURE X			TOTAL BILLING	

PAYMENT: ☐ MASTERCARD/VISA ☐ BILL ME

MasterCard/Visa # ______________________ Exp. Date ___/___

COMPONENTS CHECKED/ADJUSTED [illegible]

MAINTENANCE CONTRACT CUSTOMERS ONLY (if applicable):

I hereby acknowledge receipt of notification from NSTAR Gas that the heating / hot water equipment identified below and installed at the above service address does not qualify for coverage under the Home Heating Protection Plan for the following reasons: ___ Sized to large ___ Poor condition ___ Type not covered. I further acknowledge that, until such time as the equipment is deemed acceptable by NSTAR Gas, all requested service on such equipment will be chargeable at the current standard rates for both parts and labor.

Appliance: ________ Make: ________ Model: ________ Serial #: ________

CUSTOMER SIGNATURE: DATE:

METER INVESTIGATION:	EXISTING METER NO.	READ	NEW METER NO.	READ	ERT NO.
	[illegible]	8153	[illegible]	8195	

SAFETY COMMENT/RED TAG NO. | METER LOC. | PLEASE CIRCLE SHUT OFF / TURN ON | EXCHANGE REMOVE SET | CH WH BG DR SH KH OTH

FORM: RO-1 CAT ID 13768

REV 7/01

OFFICE COPY

ORDER NO.: 0207536 83

JUL 05 2002

NSTAR GAS
COMMITTED TO SERVING THE CUSTOMER AND THE COMMUNITY
1-800-572-9300

ACCOUNT NO:	
AT:	PHONE:
ADDRESS: 65 Main ST	APT.: 2R
TOWN/ZIP: Hopkinton	

BILLING ADDRESS:

ACCOUNT NO:	
NAME:	PHONE:
ADDRESS:	APT.:
TOWN/ZIP:	
PREVIOUS STOP TIME:	AM PM

WORK STATUS

CHARGE		METER WORK	
WARRANTY		ODOR INVEST.	
NO CHARGE		COMPLETE	
RECALL		INCOMPLETE	
ODOR DETECTED:		YES	NO

SERVICE DATE: 5 23 02	START: 1145 AM PM	STOP: 1215 AM PM	AREA/FUNC. 15-2608
PERFORMED BY: 20	START: AM PM	STOP: AM PM	AREA/FUNC.

DESCRIPTION OF WORK PERFORMED

74 x S/O CGT left card

QTY	STOCK CODE	DESCRIPTION OF MATERIALS	UNIT PRICE	AMOUNT $

LABOR CALC.:	$/HR	LABOR $	TOTAL MATERIAL	
1st 15 min.			SALES TAX	
Add'l ________			TOTAL LABOR	
SR / OTHER DISCOUNT	FLAT RATE $	QTY	FLAT RATE ODOR	
☐ Yes ☐ No			FLAT RATE PUMP	
CUSTOMER SIGNATURE X			TOTAL BILLING	

PAYMENT: ☐ MASTERCARD/VISA ☐ BILL ME

MasterCard/Visa # ______________________ Exp. Date ___/___

MAINTENANCE CONTRACT CUSTOMERS ONLY (if applicable):

I hereby acknowledge receipt of notification from NSTAR Gas that the heating / hot water equipment identified below and installed at the above service address does not qualify for coverage under the Home Heating Protection Plan for the following reasons: ___ Sized to large ___ Poor condition ___ Type not covered. I further acknowledge that, until such time as the equipment is deemed acceptable by NSTAR Gas, all requested service on such equipment will be chargeable at the current standard rates for both parts and labor.

Appliance: ________ Make: ________ Model: ________ Serial #: ________

CUSTOMER SIGNATURE: DATE:

COMPONENTS CHECKED / ADJUSTED

[illegible]		[illegible]	
[illegible]		FAN CONTROL	
[illegible]		LIMIT CONTROL	
[illegible]		[illegible]	
[illegible]		[illegible]	
THERMOSTAT		FAN HOUSING	
[illegible]		AIR FILTER	
[illegible]		[illegible]	
MODULE		[illegible]	
TRANSFORMER		[illegible]	
[illegible]		[illegible]	
[illegible]		[illegible]	
[illegible]		[illegible]	
HOT WATER		STEAM	
AQUASTAT		PRESSURETROL	
PRESSURE GAUGE		PRESSURE GAUGE	
EXPANSION TANK		GAUGE GLASS	
CIRC PUMP		LOW WATER CUT OFF	
ZONE VALVES		SWITCH/WCD	
PRESSURE RELIEF		PRESSURE RELIEF	

METER INVESTIGATION:	EXISTING METER NO. 422775	READ 6181	NEW METER NO. 0228070	READ 6756	ERT NO.
SAFETY COMMENT/RED TAG NO.	METER LOC.	PLEASE CIRCLE	SHUT OFF / TURN ON	EXCHANGE / REMOVE / SET	CH WH RG DR SH KH OTH

FORM: RO-1 CAT ID 13768 REV 7/01

OFFICE COPY

00014

ORDER NO.: 0 2 0 7 6 8 3 7 2

20h

NSTAR GAS

COMMITTED TO SERVING THE CUSTOMER AND THE COMMUNITY

1-800-572-9300

ACCOUNT NO:

NAME: Mairs PHONE:

NO S: 65 Main St. APT.: 2R

TOWN/ZIP: Hopkinton

BILLING ADDRESS:

ACCOUNT NO:

NAME: PHONE:

ADDRESS: APT.:

TOWN/ZIP:

PREVIOUS STOP TIME: AM PM

WORK STATUS			
CHARGE		METER WORK	✓
WARRANTY		ODOR INVEST.	
NO CHARGE		COMPLETE	✓
RECALL		INCOMPLETE	
ODOR DETECTED:		YES	NO

SERVICE DATE: 5.24.02 START: 1245 AM PM STOP: 100 AM PM AREA/FUNC. 2608

PERFORMED BY: 7 START: AM PM STOP: AM PM AREA/FUNC.

DESCRIPTION OF WORK PERFORMED Turn on after Meter Change

QTY	STOCK CODE	DESCRIPTION OF MATERIALS	UNIT PRICE	AMOUNT $

LABOR CALC.:	$/HR	LABOR $	TOTAL MATERIAL	
1st 15 min.			SALES TAX	
Add'l			TOTAL LABOR	
SR / OTHER DISCOUNT	FLAT RATE $	QTY	FLAT RATE ODOR	
☐ Yes ☐ No			FLAT RATE PUMP	
CUSTOMER SIGNATURE X			TOTAL CHARGE	

PAYMENT: ☐ MASTERCARD/VISA ☐ BILL ME

MasterCard/Visa # _____ Exp. Date ___/___

MAINTENANCE CONTRACT CUSTOMERS ONLY (if applicable):

I hereby acknowledge receipt of notification from NSTAR Gas that the heating / hot water equipment identified below and installed at the above service address does not qualify for coverage under the Home Heating Protection Plan for the following reasons: ___ Sized to large ___ Poor condition ___ Type not covered. I further acknowledge that, until such time as the equipment is deemed acceptable by NSTAR Gas, all requested service on such equipment will be chargeable at the current standard rates for both parts and labor.

Appliance: _____ Make: _____ Model: _____ Serial #: _____

CUSTOMER SIGNATURE: DATE:

M INVESTIGATION:

FORM: RO-1 CAT ID 13768 REV 7/01

OFFICE COPY

00015

ORDER NO.: 0 2 0 2 5 9 2 4 3

NSTAR GAS

COMMITTED TO SERVING THE CUSTOMER AND THE COMMUNITY

1-800-572-9300

ACCOUNT NO:	
[illegible]E: B Carey	PHONE:
[illegible]ESS: 65 Main St	APT.: 2 FL. LEFT
TOWN/ZIP: Hopkinton	

BILLING ADDRESS:

ACCOUNT NO:	
NAME:	PHONE:
ADDRESS:	APT.:
TOWN/ZIP:	

WORK STATUS			
CHARGE		METER WORK	✓
WARRANTY		ODOR INVEST.	
NO CHARGE		COMPLETE	✓
RECALL		INCOMPLETE	
ODOR DETECTED:		YES	NO

PREVIOUS STOP TIME: AM PM

SERVICE DATE: 5/24/02	START: 1:00 AM PM	STOP: 1:15 AM PM	AREA/FUNC. 2608
PERFORMED BY: 7	START: AM PM	STOP: AM PM	AREA/FUNC.

DESCRIPTION OF WORK PERFORMED

Lite up after Meter Change

QTY	STOCK CODE	DESCRIPTION OF MATERIALS	UNIT PRICE	AMOUNT $

LABOR CALC.:	$/HR	LABOR $	TOTAL MATERIAL	
1st 15 min.			SALES TAX	
Add'l ______			TOTAL LABOR	
SR / OTHER DISCOUNT	FLAT RATE $	QTY	FLAT RATE ODOR	
☐ Yes ☐ No			FLAT RATE PUMP	
CUSTOMER SIGNATURE X			TOTAL BILLING	

PAYMENT: ☐ MASTERCARD/VISA ☐ BILL ME

MasterCard/Visa # ______________________ Exp. Date ___/___

MAINTENANCE CONTRACT CUSTOMERS ONLY (if applicable):

I hereby acknowledge receipt of notification from NSTAR Gas that the heating / hot water equipment identified below and installed at the above service address does not qualify for coverage under the Home Heating Protection Plan for the following reasons: ___ Sized to large ___ Poor condition ___ Type not covered. I further acknowledge that, until such time as the equipment is deemed acceptable by NSTAR Gas, all requested service on such equipment will be chargeable at the current standard rates for both parts and labor.

Appliance: __________ Make: __________ Model: __________ Serial #: __________

CUSTOMER SIGNATURE: DATE:

COMPONENTS CHECKED/ADJUSTED

[illegible]

EXPANSION TANK

ZONE VALVES

PRESSURE RELIEF

[illegible]

[illegible]TER INVESTIGATION: [illegible]

[illegible]

FORM: RO-1 CAT ID 13768 REV 7/01

OFFICE COPY

ORDER NO.: 0208744930

NSTAR GAS

COMMITTED TO SERVING THE CUSTOMER AND THE COMMUNITY

1-800-572-9300

ACCOUNT NO:	
	PHONE:
ADDRESS: 65 Main St	APT.: 2L
TOWN/ZIP: Hopkinton	

BILLING ADDRESS:

ACCOUNT NO:	
NAME:	PHONE:
ADDRESS:	APT.:
TOWN/ZIP:	
PREVIOUS STOP TIME:	AM PM

WORK STATUS

CHARGE		METER WORK	
WARRANTY		ODOR INVEST.	
NO CHARGE		COMPLETE	
RECALL		INCOMPLETE	
ODOR DETECTED:		YES	NO

SERVICE DATE: 6.4.02	START: 750 AM PM	STOP: 800 AM PM	AREA/FUNC. 15-2101
PERFORMED BY: 15	START: AM PM	STOP: AM PM	AREA/FUNC.

DESCRIPTION OF WORK PERFORMED

SONP TW @61 L/t phone mess

QTY	STOCK CODE	DESCRIPTION OF MATERIALS	UNIT PRICE	AMOUNT $

LABOR CALC.:	$/HR	LABOR $		
1st 15 min.			TOTAL MATERIAL	
Add'l ________			SALES TAX	
			TOTAL LABOR	
SR / OTHER DISCOUNT	FLAT RATE $	QTY	FLAT RATE ODOR	
☐ Yes ☐ No			FLAT RATE PUMP	
CUSTOMER SIGNATURE X			TOTAL BILLING	

COMPONENTS CHECKED/ADJUSTED

MAIN BURNER	
PRESSURE GAUGE	PRESSURE GAUGE
EXPANSION TANK	GAUGE GLASS
CIRC. PUMP	LOW WATER CUTOFF
ZONE VALVES	
PRESSURE RELIEF	PRESSURE RELIEF

PAYMENT: ☐ MASTERCARD/VISA ☐ BILL ME

MasterCard/Visa # ______________________ Exp. Date ___/___

MAINTENANCE CONTRACT CUSTOMERS ONLY (if applicable):

I hereby acknowledge receipt of notification from NSTAR Gas that the heating / hot water equipment identified below and installed at the above service address does not qualify for coverage under the Home Heating Protection Plan for the following reasons: ___ Sized to large ___ Poor condition ___ Type not covered. I further acknowledge that, until such time as the equipment is deemed acceptable by NSTAR Gas, all requested service on such equipment will be chargeable at the current standard rates for both parts and labor.

Appliance: __________ Make: __________ Model: __________ Serial #: __________

CUSTOMER SIGNATURE: DATE:

METER INVESTIGATION:	EXISTING METER NO.	READ	NEW METER NO.	READ	ERT NO.

FELT COMMENT/RED CASE NO.	METER LOC.	PLEASE CIRCLE	SHUTOFF TURN ON	EXCHANGE	REMOVE	SET
				OTH WH RG DR SH KH OTH		

FORM: RO-1 CAT ID 13768 REV 7/01

OFFICE COPY

ORDER NO.: 0 2 0 8 4 4 9 3 0

20k

NSTAR GAS

COMMITTED TO SERVING THE CUSTOMER AND THE COMMUNITY

1-800-572-9300

ACCOUNT NO:

NAME: Carey PHONE:

ADDRESS: 65 Main St APT: 2 FLT.

TOWN/ZIP: Hopkinton

BILLING ADDRESS:

ACCOUNT NO:

NAME: PHONE:

ADDRESS: APT.:

TOWN/ZIP:

WORK STATUS			
CHARGE		METER WORK	✓
WARRANTY		ODOR INVEST.	
NO CHARGE		COMPLETE	✓
RECALL		INCOMPLETE	
ODOR DETECTED:	YES		NO

PREVIOUS STOP TIME: AM PM

SERVICE DATE: 6 / 5 / 02 START: 3 35 AM PM STOP: 4 05 AM PM AREA/FUNC. 2607

PERFORMED BY: 7 START: AM PM STOP: AM PM AREA/FUNC.

DESCRIPTION OF WORK PERFORMED

Shop T.O

QTY	STOCK CODE	DESCRIPTION OF MATERIALS	UNIT PRICE	AMOUNT $

LABOR CALC.:	$ / HR	LABOR $		
1st 15 min.			TOTAL MATERIAL	
			SALES TAX	
Add'l ______			TOTAL LABOR	
SR / OTHER DISCOUNT	FLAT RATE $	QTY	FLAT RATE ODOR	
☐ Yes ☐ No			FLAT RATE PUMP	
CUSTOMER SIGNATURE X			TOTAL BILLING	

PAYMENT: ☐ MASTERCARD/VISA ☐ BILL ME

MasterCard/Visa # ________________________ Exp. Date ___/___

MAINTENANCE CONTRACT CUSTOMERS ONLY (if applicable):

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Appliance: __________ Make: __________ Model: __________ Serial #: __________

CUSTOMER SIGNATURE: DATE:

COMPONENTS CHECKED/ADJUSTED

[illegible]

...H INVESTIGATION: EXISTING METER NO. [illegible] READ [illegible] NEW METER NO. READ ERT NO.

[illegible]

FORM: RO-1 CAT ID 13768

REV 7/01

OFFICE COPY

00018

20m

ORDER NO.: 02 08 54 89 5

NSTAR GAS

COMMITTED TO SERVING THE CUSTOMER AND THE COMMUNITY

1-800-572-8300

ACCOUNT NO:

PHONE:

ADDRESS: 65 MAIN ST 2L APT.:

TOWN/ZIP: HOK

BILLING ADDRESS:

ACCOUNT NO:

NAME: PHONE:

ADDRESS: APT.:

TOWN/ZIP:

PREVIOUS STOP TIME: AM PM

WORK STATUS					
CHARGE		METER WORK			
WARRANTY		ODOR INVEST.			
NO CHARGE	✓	COMPLETE	✓		
RECALL		INCOMPLETE			
ODOR DETECTED:		YES		NO	

SERVICE DATE: 6/5/02 START: 8:00 AM PM STOP: 8:25 AM PM AREA/FUNC. 15-260

PERFORMED BY: 3 START: AM PM STOP: AM PM AREA/FUNC.

DESCRIPTION OF WORK PERFORMED

LIT-UP AWH - ON SOAP RECONNECT - THIS WAS OVERLOOK ~~TP~~ ON FIRST RECONNECT

QTY	STOCK CODE	DESCRIPTION OF MATERIALS	UNIT PRICE	AMOUNT $

LABOR CALC.:	$/HR	LABOR $	TOTAL MATERIAL	
1st 15 min.			SALES TAX	
Add'l _____			TOTAL LABOR	
SR / OTHER DISCOUNT ☐ Yes ☐ No	FLAT RATE $	QTY	FLAT RATE ODOR	
			FLAT RATE PUMP	
CUSTOMER SIGNATURE X			TOTAL BILLING	

PAYMENT: ☐ MASTERCARD/VISA ☐ BILL ME

MasterCard/Visa # _____ Exp. Date ___/___

MAINTENANCE CONTRACT CUSTOMERS ONLY (if applicable):

I hereby acknowledge receipt of notification from NSTAR Gas that the heating / hot water equipment identified below and installed at the above service address does not qualify for coverage under the Home Heating Protection Plan for the following reasons: ___ Sized to large ___ Poor condition ___ Type not covered. I further acknowledge that, until such time as the equipment is deemed acceptable by NSTAR Gas, all requested service on such equipment will be chargeable at the current standard rates for both parts and labor.

Appliance: _____ Make: _____ Model: _____ Serial #: _____

CUSTOMER SIGNATURE: DATE:

EQUIPMENT CHECKED / QUOTED			
		WARM AIR	
		HUMIDIFIER	
		LIMIT CONTROL	
		BLOWER MOTOR	
		PULLEYS	
		FAN HOUSING	
		AIR FILTER	
HOT WATER		STEAM	
AQUASTAT		PRESSURETROL	
PRESSURE GAUGE		PRESSURE GAUGE	
EXPANSION TANK		GAUGE GLASS	
CIRC. PUMP		LOW WATER CUTOFF	
ZONE VALVES		SWITCH / WOO	
PRESSURE RELIEF		PRESSURE RELIEF	

METER INVESTIGATION: EXISTING METER NO.: READ: NEW METER NO.: READ ERT NO.:

SAFETY COMMENT/RED TAGE NO: METER LOC.: CIRCLE: SHUT OFF EXCHANGE REMOVE SET

TURN ON CH WH RG DR SH KH OTH

FORM RO-1 CAT ID 13768 REV 7/01

OFFICE COPY

00019

NSTAR GAS

Gas Leak Detection Survey
Daily Activity Report

Bridges	
Bus. District	
C.I. Patrol	
Mobile	X

Wind 0-5

Other	
Public Bldg.	
Recheck	
Walking	

Date 7-2-02 Weather Hazy Sun Company Hawkeye

Town	Location (from ____ to ____)
HOPKINTON	Grove St. From Hayden Rowe St. To Main St.
	Maple St. From Pleasant St. To Hayden Rowe St.
	Pleasant St. From Hayden Rowe St. To Main St.
	Price St. From Grove St. To Church St.
	E. Main St. From Grove St. To Hayden Rowe St.
	Church St. From E. Main St. To Maple St.
	Walcott St. From E. Main St. To C St.
	Walcott Valley Dr. From Walcott St. To Walcott St.
	Cedar St. From E. Main St. To End Of Main
	A St. From Cedar St. To Walcott St.
	B St. From Cedar St. To Walcott St.
	C St. From Cedar St. To Walcott St.
	Main St. From Cedar St. To Pleasant St.
	Summer St. From Main St. To Davis Rd.
	Davis Rd. From Summer St. To Dead End
	Mayhew St. From Main St. To Dead End
	Mt. Auburn St. From Main St. To Mayhew St.
	Marshall Av. From Main St. To Dead End

ture Robert Williams Hrs worked 8

page 1 of 1

00020

Nstar Gas Company

Weekly Totals

Technician: Robert Williams Company: Hawkeye

Division: Southboro

Date:	Town:	Survey Type	Leaks Found: 1	2	3	
						Sunday
7-1-02	Hopkinton	Mobile	0	0	0	Monday
7-2	Hopkinton	Mobile	0	0	0	Tuesday
7-3	Hopkinton	Mobile	0	0	1	Wednesday
7-4	—	—	—	—	—	Thursday
7-5-02	Hopkinton	Mobile	0	0	0	Friday
						Saturday
Weekly Total- - - - ->			0	0	1	

Comments: Thursday - Holiday

Signature: Robert Williams Total Hrs. Worked: 32

t:Survey form

BUSINESS DISTRICT SURVEY

R. Williams

TOWN/CITY: Hopkinton DATE: 7-15-02

STREET: Main St. (Rt. 135) CROSS ST: Church St NEG

AREA: Main St - Hayden Rowe St - Park St - Ash St

SPECIFICS OF SURVEY:

Town Square area / School on Ash St. - meters on side of bldg.

BUSINESS DISTRICT SURVEY

RWilliams

TOWN/CITY: Hopkinton

DATE: 7-15-02

NEG

STREET: West Main St.

CROSS ST: Lumber St.

AREA: 200ft. eastbound side of W.Main St.

SPECIFICS OF SURVEY:

"77 Main Street West" (minimall) - meters in rear of building

BUSINESS DISTRICT SURVEY

R. Williams

TOWN/CITY: Hopkinton DATE: 7-15-02

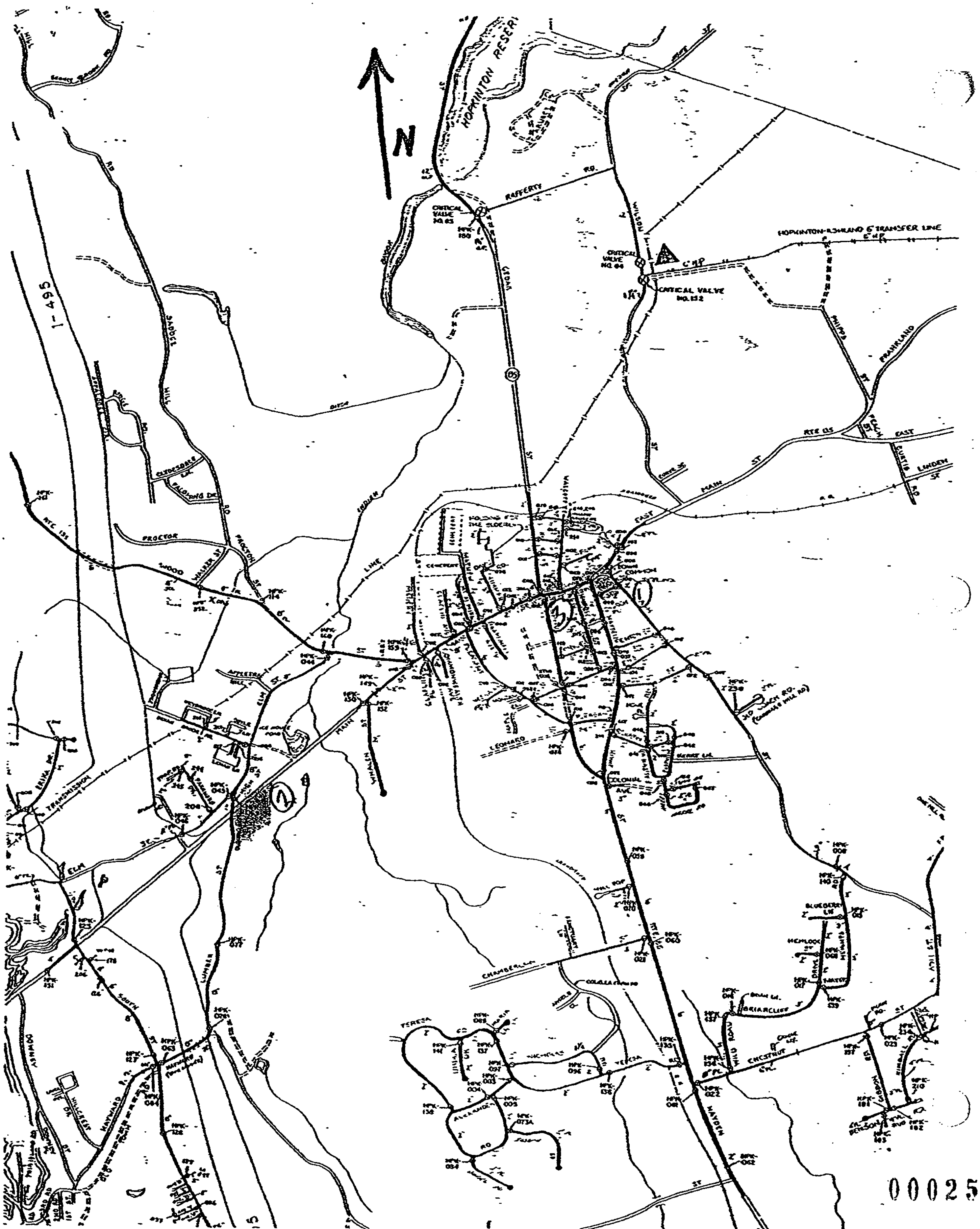
STREET: Main St. (Rt. 135) CROSS ST: Summer St
Price St

AREA: Junction of Rt. 85(Cedar St) & Rt. 135(Main St) POS
700ft on Main St.
200ft on both sides of Main St on Rt. 85
350ft on both sides of Route 85

SPECIFICS OF SURVEY:

Brigham's - gas meter in rear
Cumberland Farms - meter located on left side
Police Station - meter located on right side
(individual meters on stores but stores are connected by concrete)

Class 3 Leak @ 25 Main St.


N
I-495
RAFFERTY RD.
CRITICAL VALVE NO. 65
CRITICAL VALVE NO. 64
CRITICAL VALVE NO. 152
HOPKINTON-ASHLAND 6" TRANSFER LINE
FRANKLAND
PROCTOR
WALKER ST
MAIN ST
EAST
LINDEN
ELM
LEONARD
COLONIAL AVE
CHAMBERLAIN
TERESA
ALEXANDER
CHESTNUT
BRIARCLIFF
BLUEBERRY LN
HEMLOCK
HAYWARD
SOUTH
LUMBER
WHALEN
TRANSMISSION
BENSON

NSTAR GAS
COMPANY ACTIVITY REPORT
COMPANY 200

578414

DIG-SAFE #	PERMIT #	SHEET	OF
20023005053	NEEDED	1	1

ADDRESS	TOWN	DATE	COST AREA	WORK ORDER
65 MAIN ST.	HOP	7.24.02	34310	

TYPE OF WORK	CODE NUMBER	OLD SERVICE SIZE	MATRL	YR	PRESS	LENGTH	OLD MAIN SIZE	MATRL	YR	PRESS	LENGTH	ACCOUNT# AND SUB ACCOUNT#
												887068 - 04

LEAK REPORT#	BARRICADES #	PLATES - NUMBER	SIZE
			X
LEAK CLASS			X
			X

DEPTH OF PITS:

CONDITION OF PIPE:

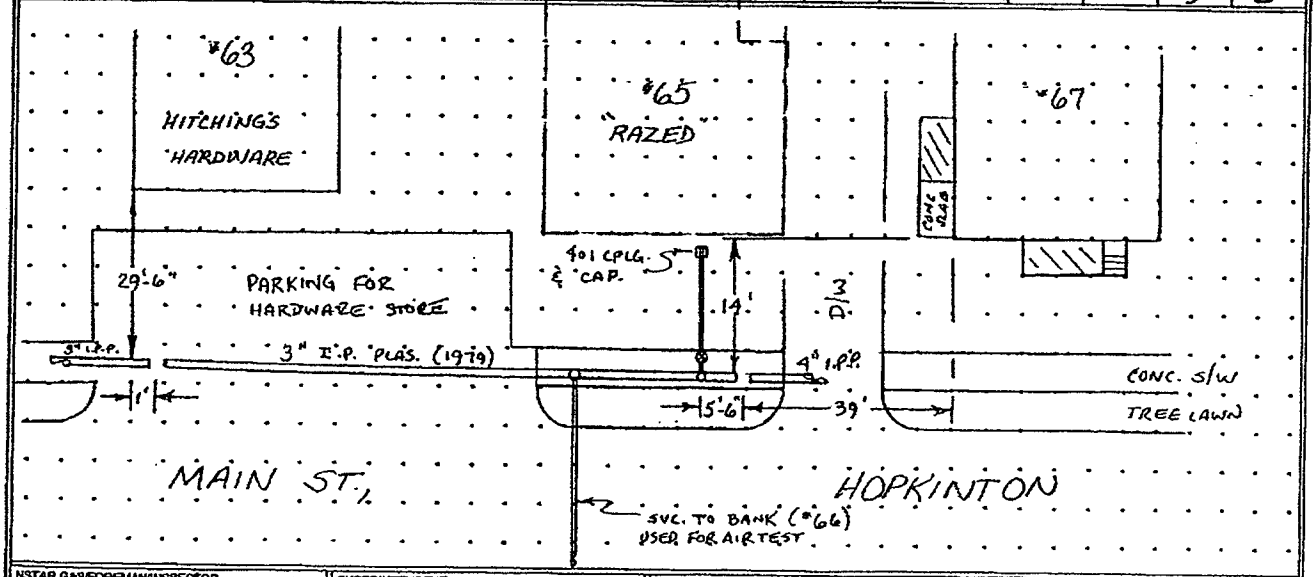
PAVING L	W	TH	TYPE	LOC	SOD / LS. L	W	PIPELINE FOOTAGE	SIZE	MAT	PRESS	DEPTH	SAND, HT OR GRAVEL	LEDGE / BOULDERS L	W	D	HOLES L	W	D	MAIN VALVES
9'	4'	4"			AIR		86'	3"	PLAS	I.P.	3'								
6'	3'	4'			TESTED														

REMARKS: CREW CALLED IN AND RESPONDED TO INCIDENT AT #65 MAIN ST, HOPKINTON. COULD NOT ACCESS TAP LOCATION OR CURB COCK DUE TO POSITION OF HOUSE. CREW EXCAVATED TWO (2) HOLES AND SQUEEZED OFF AND ISOLATED MAIN & SERVICE TO #65. CREW EXCAVATED AND CUT AND CAPPED EXISTING ½" I.P. INSIDE OF FOUNDATION WALL. CREW ALSO CUT AND CAPPED AFFECTED SECTION OF MAIN IN FRONT OF #65. APPLIED AIR-TEST & SOAP TESTED ALL FITTINGS. AIR-TEST - O.K. - PLACED MAIN HOLES AND BACKFILLED SERVICE HOLE.
NOTE: 50 PSIG AIR-TEST REQUESTED BY D.T.E.

PERSONNEL AND EQUIPMENT

EQUIPMENT & VEHICLES	NAME OR JOB TITLE	HOURS
6140	P. HYNES	
LD 48	C. KRAGER	
6111	M. MINASIAN	
LD15	B. GARDUNA	
4575	P. COSKIE	

MATERIAL	PLAS	STL	SIZE	QUAN	MATERIAL	PLAS	STL	SIZE	QUAN	MATERIAL	PLAS	STL	SIZE	QUAN
PIPE					TEE					REDUCER	✓		4x3	2
PIPE					T.D.W. TOP					L.W. COOK				
METER FIT					T.D.W. TEE					ELBOW				
RISER					EXP PLUG					CLAMP				
COUPLING 401			½"	1	PLUG					PLCS KIT				
VALVE					CAP	✓		4"	4	MAXI CPLNG				
WIRE					VALVE BOX					FLOW LIMITER				
TAPE CAP			½"	1	TRNS FIT					EL FUSION CPLG	✓		4"	2
POSI LOCK					ANODES					EL FUSION CPLG			3"	2



NSTAR GAS FOREMAN/INSPECTOR	SUPERINTENDENT	CONTRACTOR	CONTRACTOR FOREMAN
Scott Clayton	WEG		

MF-5 CAT ID 13731 2/01

ORIGINAL

00026

Information Request PESD-3

Please provide any and all documents recording or memorializing the results of NSTAR Gas Company personnel or contractor personnel inspections, surveys, or monitoring of the interior segment of the service pipeline at 65 Main Street, Hopkinton between and including the date from the service pipeline installation to July 24, 2002.

Response

Please see the response to Information Request PESD-2 for copies of available documents relating to activities undertaken by NSTAR Gas at 65 Main Street.

Information Request PESD-4

Please provide any and all documents recording or memorializing any atmospheric corrosion evaluation, monitoring, or control by NSTAR Gas Company or its contractor for the interior segment of the service pipeline at 65 Main Street, Hopkinton since installation of the plastic segment of the service pipeline.

Response

There was no federal or state requirement, industry practice or O&M procedure that would require the Company to evaluate or monitor "atmospheric corrosion" on service lines that are located within residential buildings, such as those located 65 Main Street.

Information Request PESD-5

Please provide any and all documents recording or memorializing any leakage surveys of NSTAR gas facilities and equipment located inside the structure at 65 Main Street, Hopkinton, in accordance with NSTAR Gas Company's written procedures, conducted during leakage surveys of the Business District of Hopkinton on January 10, 2002, July 2, 2002, or on any other date from January 1, 2000 to July 24, 2002.

Response

Please see the response to Information Request PESD-2 for copies of available documents relating to activities undertaken by NSTAR Gas at 65 Main Street.

Information Request PESD-6

Please provide any and all documents recording or memorializing any leakage survey conducted by NSTAR Gas Company in the Business District of Hopkinton from January 1, 2000 to July 24, 2002.

Response

A. Exterior Leak Surveys

During 2002, the Company conducted several leak surveys in proximity to the business district encompassing 65 Main Street in Hopkinton:

1. On January 10, 2002, NSTAR Gas performed a walking leak survey in and around the business district encompassing 65 Main Street;
2. On July 2, 2002, NSTAR Gas performed a mobile leak survey in and around the business district encompassing 65 Main Street; and
3. On July 15, 2002, NSTAR Gas performed a "Business District" survey in the business district encompassing 65 Main Street.

B. Interior Leak Surveys

Consistent with the Company's O&M procedures, NSTAR Gas performed leak surveys on the interior service line at 65 Main Street in association with meter exchanges on the following dates: February 22, 2002; March 6, 2002 (meter exchange and gas odor call); March 12, 2002; May 23, 2002 (two meter exchanges).

Documentation associated with all of the surveys listed above is provided in Attachment PESD-2. Please note that, in accordance with 220 C.M.R. § 101.06(21)(f), survey records are maintained only until the next survey of that type is completed, and therefore, documentation of business district and periodic leak surveys in the years preceding 2002 is not available.

Information Request PESD-7

Please provide any and all documents recording or memorializing any pressure test establishing a maximum allowable operating pressure ("MAOP") pursuant to 49 C.F.R. § 192.619 prior to activating the plastic segment of the service pipeline at 65 Main Street, Hopkinton.

Response

The regulation cited in the question, 49 C.F.R. § 192.619, requires plastic pipelines to be tested to an MAOP of 1.5 times their MAOP prior to operation. See 49 C.F.R. § 192.619(a)(2)(i). The regulation (49 C.F.R. § 192.619) does *not* impose a record retention requirement.

With respect to the testing requirement set forth in 49 C.F.R. § 192.619(a)(2)(i), it was the Company's standard operating procedure at the time that the plastic segment of service pipeline was installed at 65 Main Street (1974) to pressure test service lines to 1.5 times the maximum operating pressure (i.e., 90 psig on a 60-psig service line). The O&M procedures in effect at the time of installation of the service line are provided as Attachment PESD-7.

In 1974, there was no record retention requirement at either the federal or state level. There is *currently* a record-retention requirement at both the state and federal level; however, the federal regulations require that documentation of pressure tests on newly installed plastic service lines be maintained for only five years. See 49 C.F.R. § 192.517(b). The federal regulations setting forth a record retention requirement were established only in 2003, and thus, were not in effect during the period in question. Even if applicable in 1974, the regulation would not have required the retention of the pressure-test record after 1979.

It should also be noted that, regardless of any pressure test record from the 1970s, the Department has established that the service line to 65 Main Street was operating at 57 psig at the time of the incident on July 24, 2002 (see Incident Report at 6). Therefore, the operating pressure of the gas service at 65 Main Street is not a factor in the incident.

NEW ENGLAND GAS AND ELECTRIC SYSTEM

GAS STANDARDS - SERVICES

STD. NO. C-245

PAGE ____ OF ____

APP. 3/20/64-Gas Standards Comm. APPROVED GHG

DATE 4/9/64

REV.	DATE		APP.
1	12-27-67	Test Period Changed	CGP
2	1-28-76	General Revision	

TESTING SERVICES
LESS THAN 100 P.S.I.G.

1. Steel Services:

   a. Steel services with a maximum allowable operating pressure (MAOP) of 100 psig or less shall be tested for tightness to 100 psig for a period of at least 15 minutes.

   b. Steel services with a maximum allowable operating pressure (MAOP) of 100 psig but to a pressure which produces less than 20% of specified minimum yield strength (SMYS) shall be tested for tightness to at least 100 psig for a period of at least 15 minutes; however, it is preferable that this test be conducted at 1.5 times the MAOP.

   c. The test medium shall be compressed air or inert gas.

   d. The test medium shall preferably be supplied at the street end of the service before the service is connected to the main through the top of the tapping tee before the tap is completed. When stub services have been previously installed, the test medium may be applied at the meter riser. A test pressure gauge having a range of 0 to 150 psig shall be installed at the supply connection. The supply hose must be disconnected during the test. Any drop in pressure during the 15 minute test period shall constitute leakage and must be located and repaired before repeating the test. Upon satisfactory completion of the test, the test medium shall preferably be relieved at the street end. Refer to C-247 for purging.

   e. Tie-in joints shall be tested for tightness at the available pressure after the gas is turned on to the service.

2. Plastic Services:

   a. Plastic services with a maximum allowable operating pressure (MAOP) of 100 psig or less shall be tested to 1.5 times the MAOP or to 90 psig, whichever is greater, for a period of at least 15 minutes. In any case the test pressure shall be limited to three times the design pressure.

   b. Provisions c., d., & e., in section 1 above also apply to plastic services.

Information Request PESD-8

Please provide any and all documents establishing the MAOP of the plastic segment of the service pipeline prior to its installation at 65 Main Street, Hopkinton in 1974.

Response

Please see the response to Information Request PESD-7.

Information Request PESD-9

Please provide your response(s) to the NOPV, D.T.E. 03-PL-19 issued to NSTAR Gas Company on November 7, 2003.

Response

Please see Attachment PESD-9, which is the December 10, 2003 response of NSTAR Gas Company to the NOPV.

Attachment
PESD-9

RESPONSE OF NSTAR GAS COMPANY TO THE NOTICE OF PROBABLE VIOLATION ISSUED BY THE DEPARTMENT OF TELECOMMUNICATIONS

DTE 03-PL-19

December 2003

THE COMMONWEALTH OF MASSACHUSETTS

OFFICE OF CONSUMER AFFAIRS AND BUSINESS REGULATION

DEPARTMENT OF TELECOMMUNICATIONS & ENERGY

ONE SOUTH STATION

BOSTON, MA 02110
(617) 305-3500

MITT ROMNEY
GOVERNOR

KERRY HEALEY
LIEUTENANT GOVERNOR

BETH LINDSTROM
DIRECTOR
OFFICE OF CONSUMER AFFAIRS
AND BUSINESS REGULATION

PAUL G. AFONSO
CHAIRMAN

JAMES CONNELLY, ESQ.
COMMISSIONER

W. ROBERT KEATING
COMMISSIONER

EUGENE J. SULLIVAN, JR.
COMMISSIONER

DEIRDRE K. MANNING
COMMISSIONER

CERTIFIED MAIL - RETURN RECEIPT REQUESTED
NOTICE OF PROBABLE VIOLATION

November 7, 2003

D.T.E. 03-PL-19

Mr. Samy Ibrahim
Vice President, Gas Operations
NSTAR Gas Company
One NSTAR Way
Westwood, MA 02090-9230

Dear Mr. Ibrahim:

On July 24, 2002, an incident involving a release of natural gas occurred at 65 Main Street, Hopkinton. This incident resulted in two fatalities, injuries to other persons and significant property damage. The Pipeline Engineering and Safety Division ("Division") of the Department of Telecommunications and Energy ("Department") investigated the incident as required by G.L. c. 164, § 105A and a Federal Certification Agreement as provided by 49 U.S.C. § 60105.

On November 7, 2003, the Department issued the incident report to the United States Department of Transportation as required by 49 U.S.C. § 60105. Attendant to the incident report, the Department has reason to believe that the operator of the distribution system,

NSTAR Gas Company ("NSTAR"), has committed probable violations of the federal pipeline safety regulations contained in 49 C.F.R. Part 192. The probable violations are set forth below:

1. NSTAR has no records to demonstrate that the service line segments, installed in 1974 and 1979 at 65 Main Street, Hopkinton, were tested to establish a maximum allowable operating pressure ("MAOP"). NSTAR should have tested each service line segment to 1.5 times the MAOP. Therefore, the Department has reason to believe that NSTAR may be in violation of 49 C.F.R. Part 192:

> "(a) Except as provided in paragraph (c) of this section, no person may operate a segment of steel or plastic pipeline at a pressure that exceeds the lowest of the following:
>
> . . . .
>
> (2) The pressure obtained by dividing the pressure to which the segment was tested after construction as follows:
>
> (i) For plastic pipe in all locations, the test pressure is divided by a factor of 1.5."

49 C.F.R. § 192.619(a)(2)(i).

2. In failing to meet the requirements of 49 C.F.R. Subpart L, the Department has reason to believe that NSTAR may be in violation of 49 C.F.R. Part 192:

> (a) No person may operate a segment of pipeline unless it is operated in accordance with this subpart.

49 C.F.R. § 192.603(a).

3. NSTAR did not monitor the steel service line in the basement of 65 Main Street, Hopkinton for atmospheric corrosion in the five-year period prior to July 24, 2002. Therefore, the Department has reason to believe NSTAR may be in violation of 49 C.F.R. Part 192:

"After meeting the requirements of § 192.479 (a) and (b), each operator shall, at intervals not exceeding 3 years for onshore pipelines ... reevaluate each pipeline that is exposed to the atmosphere and take remedial action whenever necessary to maintain protection against atmospheric corrosion."

49 C.F.R. § 192.481.

4. NSTAR failed to perform leakage surveys of its service lines located inside 65 Main Street, Hopkinton. Therefore, the Department has reason to believe NSTAR may be in violation of 49 C.F.R. Part 192:

> "(a) Each operator of a distribution system shall conduct periodic leakage surveys in accordance with this section.
> (b) The type and scope of the leakage control program must be determined by the nature of the operations and the local conditions, but it must meet the following minimum requirements:
> (i) A leakage survey with leak detector equipment must be conducted in business districts, including tests of the atmosphere in gas, electric, telephone, sewer, and water system manholes, at cracks in pavement and sidewalks, and at other locations providing an opportunity for finding gas leaks, at intervals not exceeding 15 months, but at least once each calendar year."

49 C.F.R. § 192.723.

5. In failing to follow its written procedures in 1, 2, 3, and 4 above, the Department has reason to believe NSTAR may be in violation of 49 C.F.R. Part 192:

> "(a) *General*. Each operator shall prepare and follow for each pipeline, a manual of written procedures for conducting operations and maintenance activities and for emergency response."

November 7, 2003

49 C.F.R. § 192.605(a).

An operator who violates any code pertaining to the safety of pipeline facilities is subject to a civil penalty not to exceed $1,000 for each violation for each day that the violation exists up to a maximum of $200,000 for any related series of violations. G.L. c. 164, § 105A.

The Division has reviewed the circumstances of the allegations and is prepared to accept NSTAR's agreement to the terms in the attached proposed Consent Order to settle the case. Attached to, and made a part of this Notice of Probable Violation, is a description of the courses of action available to NSTAR in responding to this Notice. Please note that regardless of the course of action NSTAR elects to follow, you must respond within thirty (30) days of your receipt of this Notice. Your failure to respond within thirty (30) days will be deemed an admission to the allegations contained herein and a waiver of your rights to contest them. If you fail to respond within thirty (30) days, the Department may, without further notice, find the facts to be as alleged herein and issue a final Order.

Very truly yours,

Robert F. Smallcomb, Jr
Director
Pipeline Engineering and
Safety Division

Enc: Consent Order

OFFICE OF CONSUMER AFFAIRS AND BUSINESS REGULATION

DEPARTMENT OF TELECOMMUNICATIONS & ENERGY

In the matter of
NSTAR Gas Company
Respondent

D.T.E. 03-PL-19

CONSENT ORDER

(1) This document, with the attached Compliance Agreement, is a Consent Order, entered into between the Department of Telecommunications and Energy (the "Department") and the Respondent; and is executed in accordance with 220 C.M.R. § 69.08. Failure to comply with the terms of this Consent Order may result in the assessment of civil penalties and/or in referral of the matter to the Attorney General for appropriate action. The terms and conditions of this Consent Order become effective upon signing by the authorized representatives of the Respondent and the Department.

(2) Pursuant to G.L. c. 164, § 105A and 49 U.S.C. § 60105, the Department conducted an investigation of an incident which occurred on July 24, 2002. As a result of the investigation, the Director of the Pipeline Engineering and Safety Division issued to the Respondent by letter, dated November 7, 2003, a Notice of Probable Violation, D.T.E. 03-PL-19, in accordance with 220 C.M.R. § 69.03.

(3) The Department finds that the Respondent violated sections of the pipeline safety regulations contained in Title 49 C.F.R. Part 192, specifically:

Subpart I - Requirements for Corrosion Control
49 C.F.R. § 192.481 Atmospheric Corrosion Control: Monitoring.

Subpart L - Operations
49 C.F.R. § 192.603 - General Provisions;
49 C.F.R. § 192.605 - Procedural Manual for Operations, Maintenance and Emergency Response;
49 C.F.R. § 192.619 - Maximum Allowable Operating Pressure: Steel or Plastic Pipelines.

Subpart M - Maintenance
49 C.F.R. § 192.723 - Distribution Systems: Leakage Surveys.

(4) The Respondent acknowledges that the Department finds that the above-cited violations occurred. In signing this Consent Order, the Respondent agrees to take the actions set forth in the attached Compliance Agreement, however, the Respondent does not agree that a violation of any Department or federal pipeline safety regulation occurred in relation to the above matters.

(5) This is a final Order of the Department. The Respondent expressly waives any right to appeal or right to judicial review that might otherwise attach to a final Order of the Department.

Samy Ibrahim Date
Vice President - Gas Operations
NSTAR Gas Company

Robert F. Smallcomb Date
Director, Pipeline Engineering
and Safety Division

COMPLIANCE AGREEMENT BETWEEN THE DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY AND NSTAR GAS COMPANY

D.T.E. 03-PL-19

1. Within 30 days of the effective date of this Compliance Agreement, NSTAR Gas Company ("NSTAR") shall provide the Department with a list of the service lines in the Hopkinton business district, identifying the dates of installation of the service lines, the dates of any service line replacements, the date of the pressure test of each service line or service line segment, the test pressure and the test duration used to determine the maximum allowable operating pressure.

2. Within 60 days of the effective date of this Compliance Agreement, NSTAR shall provide the Department with the total number of service lines connected to meters inside of buildings, by municipality. For each municipality, NSTAR shall distinguish those service lines within the business district and those outside of the business district.

3. Within 60 days of the effective date of this Compliance Agreement, NSTAR shall modify its operating and maintenance manual to explicitly require its personnel to perform leakage surveys on service line segments inside buildings to meet the applicable leakage survey requirements of 49 C.F.R. § 192.723. Upon completion, NSTAR shall forward a copy of the revised text to the Department.

4. Within twelve months of the effective date of this Compliance Agreement, NSTAR shall complete the leakage survey of all service line segments inside buildings within each business district.

5. Within 36 months of the effective date of this Compliance Agreement, NSTAR shall complete the leakage survey of all service line segments inside buildings outside of a business district.

6. On a monthly basis, NSTAR shall provide the Department with a list by municipality of the total number of number of service line segments inside buildings that have been leakage surveyed and the number of leaks found. The total numbers shall be sorted as within business districts or outside of business districts.

7. Within 60 days of the effective date of this Compliance Agreement, NSTAR shall modify its operating and maintenance manual to explicitly require its personnel to evaluate or reevaluate service line segments inside buildings to meet the general, monitoring and maintenance requirements of 49 C.F.R. §§ 192.479 and 192.481. Upon completion, NSTAR shall forward a copy of the revised text to the Department.

8. Concurrent with the first leakage survey cycle in items 4 and 5, NSTAR shall evaluate or reevaluate for atmospheric corrosion each service line segment inside a building.

9. On a monthly basis, NSTAR shall provide the Department with the number of service line segments that have been evaluated and the number requiring remedial action to maintain protection against atmospheric corrosion.

10. As with any operating, maintenance or emergency response function, any individual performing tasks in the above items 4, 5, or 8 shall meet the applicable requirements of 49 C.F.R. Part 192, Subpart N and 49 C.F.R. Part 199.

11. NSTAR shall maintain a record of each test, survey or inspection required by items 4, 5, and 8. The records shall be maintained for these functions for a minimum of ten years unless more stringent regulatory requirements prevail.

12. Within 30 days of the effective date of this Compliance Agreement, NSTAR shall pay a civil penalty of $200,000.00 by check or money order to the Commonwealth of Massachusetts.

MASSACHUSETTS DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

RESPONSE OPTIONS TO NOTICE OF PROBABLE VIOLATION IN ACCORDANCE WITH 220 C.M.R. 69.04 OR 69.08

Within thirty (30) days of receipt of the NOPV, the Respondent shall respond to the Department in one of the following ways:

1. Pay the proposed civil penalty by check or money order to the Commonwealth of Massachusetts, sign the Consent Order and close the case;

2. Submit an offer in compromise of the proposed civil penalty under 220 C.M.R.69.04(2);

3. Request an informal conference under 220 C.M.R. 69.05; or

4. Submit a written reply to the Department disputing the violation(s) in the NOPV. The reply must include a complete statement of all relevant facts and authority and full description of the reasons why the Respondent disputes the violation(s) alleged in the NOPV.

KEEGAN, WERLIN & PABIAN, LLP

ATTORNEYS AT LAW
265 FRANKLIN STREET
BOSTON, MASSACHUSETTS 02110-3113

(617) 951-1400

TELECOPIERS:
(617) 951-1354
(617) 951-0586

December 10, 2003

Mary L. Cottrell, Secretary
Department of Telecommunications and Energy
One South Station
Boston, MA 02110

Re: NSTAR Gas Company, D.T.E. 03-PL-19

Dear Secretary Cottrell:

Pursuant to 220 C.M.R. § 69.04 (1)(d), NSTAR Gas Company ("NSTAR Gas" or the "Company") hereby submits its response to the Notice of Probable Violation ("NOPV") that was issued by the Pipeline Engineering and Safety Division (the "Division") of the Department of Telecommunications and Energy (the "Department") on November 7, 2003.[1]

As indicated in the attached response, the Company is contesting each of the allegations in the NOPV and many of the findings contained in the Incident Report. It is the Company's intent to contest the Division's allegations and findings in all available jurisdictional venues, and therefore, the Company wishes to avail itself fully of the procedural remedies available under 220 C.M.R. § 69.00. Accordingly, prior to the initiation of an adjudicatory proceeding in this matter pursuant to 220 C.M.R. § 69.06, the Company would be available pursuant to 220 C.M.R. § 69.05 for an informal conference to review the allegations contained in the NOPV and the Company's response to those allegations.

Should the Division desire to proceed with such an informal conference prior to the commencement of an adjudicatory proceeding, I am available at your convenience to proceed with the scheduling of that conference. In the alternative, I am available for the scheduling of a pre-hearing conference to discuss the conduct of the applicable adjudicatory proceeding.

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[1] In its NOPV, the Division relied on information that is contained in an Incident Report, which was provided to the Company on November 10, 2003. As agreed to by the Division, NSTAR Gas' reply is being submitted within 30 days of its receipt of the Incident Report.

In the interim, please contact me should you have any questions concerning this filing. Thank you for your assistance.

Sincerely yours,

Robert J. Keegan

cc: Yvette Bégué, Acting General Counsel
Robert F. Smallcomb, Jr., Director, Pipeline Engineering and Safety Division
Joseph Rogers, Assistant Attorney General

COMMONWEALTH OF MASSACHUSETTS

DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

In the Matter of NSTAR Gas Company Notice of Probable Violation	)	D.T.E. 03-PL-19

RESPONSE OF NSTAR GAS COMPANY TO THE NOTICE OF PROBABLE VIOLATION ISSUED BY THE DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Submitted by:

Robert J. Keegan, Esq.
Cheryl M. Kimball, Esq.
Keegan, Werlin & Pabian, LLP
265 Franklin Street
Boston, MA 02110
(617) 951-1400

Dated: December 10, 2003

In the Matter of NSTAR Gas Company Notice of Probable Violation	)	D.T.E. 03-PL-19

RESPONSE OF NSTAR GAS COMPANY
TO THE NOTICE OF PROBABLE VIOLATION
ISSUED BY THE
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

I. INTRODUCTION

On November 7, 2003, the Department of Telecommunications and Energy (the "Department") issued an Incident Report to the U.S. Department of Transportation ("USDOT") pertaining to its investigation of an incident involving the release of natural gas at 65 Main Street, Hopkinton, Massachusetts on July 24, 2002. The Incident Report was issued by the Department pursuant to G.L. c. 164, § 105A and USDOT regulations, which in the event of an accident or incident, require the Department to: (1) investigate the operator's compliance with the Minimum Federal Safety Standards contained in 49 C.F.R. Part 192 and the Massachusetts pipeline safety regulations contained in 220 C.M.R. §§ 100-113; and (2) provide the DOT with a summary of its investigation of the "cause and circumstances" surrounding the incident. 49 U.S.C. § 60105(c)(B). Concurrent with the issuance of the Incident Report, the Department issued a Notice of Probable Violation ("NOPV") to NSTAR Gas Company ("NSTAR Gas" or the "Company") alleging non-compliance with three provisions of the federal pipeline safety

regulations.[1] However, as discussed below, the Department's NOPV is substantively and legally flawed and should be withdrawn by the Department.

The Company's deep concern from an overall perspective is that, in combination, the Incident Report and the NOPV erroneously imply that there is a nexus between the cause of the incident and alleged non-compliance with the federal safety regulations specified by the Department. As an initial matter, the Department has not validly construed or applied the regulations in question, and therefore, the Department's allegations are unfounded. However, even if the regulations were validly applied, the Company's "compliance" or "non-compliance" with the regulations specified by the Department would not have had any impact on the occurrence of the incident. Therefore, contrary to the misleading implications of the Department's Incident Report and NOPV, there is no connection between the "cause and circumstances" surrounding the incident and compliance with the federal safety regulations specified by the Department.[2]

The Company will show in this response that: (1) the Department's investigation of the "causes and circumstances" surrounding the incident has produced no evidence that any actions or inactions by NSTAR Gas caused, or were connected to, the unfortunate incident; and (2) the "probable violations" alleged by the Department are merely contrived misapplications of federal safety regulations that have no foundation in Department practice or precedent.

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1 In the NOPV, the Department disaggregates its alleged violations into five components. However, the second allegation, involving 49 C.F.R. § 192.603(a), duplicates the first allegation and the fifth allegation, involving 49 C.F.R. § 192.605(a), duplicates the four previous allegations.

2 In fact, in light of the unfortunate circumstances of the incident, the Department's issuance of the Incident Report should have been delayed pending the conclusion of the investigation into the cause of the incident by the Massachusetts State Fire Marshal.

In addition, the Department's presentation of the Incident Report and the NOPV obscures several important facts uncovered by the Department in the course of its own investigation. These facts are:

(1) The Department's investigation showed that there was no failure of Company-owned equipment at 65 Main Street.

- All of the gas piping and appurtenant equipment owned by NSTAR Gas was removed from 65 Main Street following the incident and tested by an independent engineering consultant, Massachusetts Materials Research, Inc. ("MMR"), which was selected and retained by the Department.[3] See, Incident Report at 16, 21-22, 32.

- MMR performed a series of tests on the piping, meters, regulator, transition fitting and associated fittings recovered from the building in accordance with a pre-determined protocol developed by the Department and MMR. The testing protocol included a detailed visual inspection, radiographic inspection, leak testing, nitrogen gas flow testing, regulator-pressure testing, downstream over-pressure testing, electron microscope examination, and chemical analysis. See, Incident Report at 22-26; MMR Report at 3-5.

- On August 8, 2003, MMR reported the results of its investigation finding that there was no failure of NSTAR Gas equipment. See, Incident Report at 22-

[3] In the Incident Report, the Department twice states that NSTAR selected MMR to perform the materials testing for the Department's investigation. Incident Report at 16, 32. This statement is not true. As acknowledged by the Department's counsel at a hearing held on June 24, 2003, pertaining to the civil suit brought against NSTAR in relation to the incident, MMR's client is the Department. The Company had no role or input in the decision to select and retain MMR to perform the testing.

23, 26, 32; MMR Report at 48-51. The summary results of MMR are provided herewith as Appendix 1.

(2) **The Department's investigation showed that there was no leakage in the main and service-line segments at 65 Main Street.**

- Immediately following the incident, NSTAR Gas successfully conducted a pressure test of an 86-foot segment of the main and service line, which constitute the distribution system external to the foundation at 65 Main Street. The test was witnessed by the Department. The pressure test ruled out any distribution line leakage in proximity to the structure. See, Incident Report at 9, 32.

(3) **The Department's investigation showed that NSTAR Gas conducted the required business-district leak surveys on Main Street in January and July of 2002 and found no leaks in the area.**

- The record shows that NSTAR Gas performed a leak survey at 65 Main Street on January 10, 2002, in accordance with its O&M Plan. See, Incident Report at 12-13. The Company detected only one leak on the service lines located between 2 and 106 Main Street, which was a Class 3 non-hazardous leak at 74 Main Street. Id. This non-hazardous leak was repaired on January 15, 2002.

- The record shows that NSTAR Gas conducted a business-district leak survey of the distribution system underlying Main Street just prior to the incident on July 2, 2002, finding no leaks. See, Incident Report at 13.

(4) The Department's investigation showed that NSTAR Gas tested for gas leaks when entering the premises at 65 Main Street on at least five occasions in the months just prior to the incident and found no leaks.

- The record shows that, in the six months prior to the incident (February through June), NSTAR Gas entered the premises at 65 Main Street on nine occasions to respond to service calls and to perform meter exchanges of the five meters located therein. See, Incident Report at 10-12.

- Consistent with standard operating practice, the NSTAR Gas service technician entering the premises to perform the (five) meter exchanges tested the company-owned, interior service line from the foundation wall to the meter using a Bascom-Turner portable leak-survey unit, referred to as combustible gas indicator ("CGI").[4]

- The record shows that NSTAR Gas personnel detected no leakage or odor of residual gas in the course of their work at the 65 Main Street premises. See, Incident Report at 20; Exhibit 20.

- The record shows that NSTAR Gas took odorometer readings on the day of the incident to determine the intensity of the odorant in the natural gas flowing through Main Street. In addition, the Department reviewed the 2002 weekly odorant levels throughout the area surrounding Hopkinton. In both analyses,

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[4] The NSTAR service technician who performed the meter exchanges provided sworn testimony on this point on November 26, 2003, in the civil suit filed against NSTAR Gas in relation to the incident. Specifically, the service technician testified that he checked for gas leaks on the company-owned interior service line up to the meters (including the meter fittings) using the CGI unit on each occasion that he entered to perform a meter exchange. The Company's records show these occasions to be February 22, 2002, March 6, 2002, March 12, 2002 and two times on May 23, 2002. Incident Report at 12. A fifth test was conducted by a different NSTAR Gas technician in response to an odor call on March 6, 2002. Id. at 10-12.

the odorant level met all state and federal detection levels. See Incident Report at 15, 31.

In light of these factors, it is clear that the Department's investigation of the "causes and circumstances" surrounding the incident produced no evidence that any actions or inactions by NSTAR Gas caused, or were even connected to, the unfortunate incident. To the contrary, the Department's investigation has revealed the following: (1) independent testing confirmed that there was no failure of NSTAR-owned equipment; (2) post-incident pressure testing eliminated the possibility of distribution line leakage in proximity to the structure; (3) the Company performed all required business-district leak surveys in the Main Street area within days prior to the incident and no leaks were detected; and (4) the Company surveyed and detected no leaks when entering the interior premises in the six months immediately prior to the incident.

In fact, the only negative aspersions cast on the Company in the Incident Report and NOPV are the Department's assertions that NSTAR Gas may not have complied with three federal safety regulations, which happen to be wholly unrelated to the incident.[5] As discussed below, the Department's alleged violations are based on misinterpretations and misapplications of the federal regulations, and even if true, would have no bearing on the incident that the Department is purporting to investigate. Despite this shaky foundation and the irrelevance of the alleged infractions, the Department has proposed a fine of extraordinary magnitude, which furthers the appearance of a nexus between the incident and NSTAR's operation of the distribution system. However, given that there is no basis

[5] All sections of the federal code cited in this response are provided in Appendix 2.

in fact, law or Department precedent to support the alleged probable violations in the Department's NOPV, the Department should withdraw its NOPV.

II. RESPONSE TO THE DEPARTMENT'S ALLEGED VIOLATIONS

A. NSTAR Gas Is Not In Violation of 49 C.F.R. Part 192 Because the Department Has Erroneously Asserted that There Was a Requirement to Retain Pressure-Test Records for the Service Installed at 65 Main Street

⇒ NOPV

In the NOPV, the Department alleges that the Company may have violated 49 C.F.R. § 192.619(a)(2)(i), which is a single provision of the federal code that falls under Subpart L (Operations).[6] This section of the federal code states that no person may operate a segment of steel or plastic pipe at a pressure exceeding the maximum allowable operating pressure ("MAOP"). However, based on the statements in the Incident Report regarding the basis for the allegation, the Department is not alleging that it believes the Company was operating the plastic service line at 65 Main Street beyond its MAOP, which is 60 pounds per square inch gauge ("psig"). To the contrary, records provided to the Department and included in the Incident Report show that the Company was operating the service lines at a normal operating pressure of 57 psig. See, Incident Report at 6; Exhibit 8.

Instead, the Department's allegation hinges solely on the fact that there is no document demonstrating that NSTAR performed a pressure test to establish the MAOP prior to placing the two service-line segments into service. NOPV at 2; Incident Report at 7. As the Company will show below, the two service-line segments in question were installed in 1974 and 1979, when no applicable state or federal regulation required the

Company to retain a record of the pressure test. In making the first allegation, the Department ignores this fact and makes the following series of assumptions: (1) there is no document demonstrating that NSTAR Gas performed a pressure test at the time of installation, therefore; (2) no test occurred, therefore; (3) the MAOP was not established, and therefore; (4) the Company may be operating the service line beyond the MAOP in violation of Section 192.619.

These assumptions are erroneous because the Company was not required to retain a record of the pressure test that it performs prior to placing new lines into service.[7] Nor is the Department alleging in the NOPV that the Company violated a pressure testing record-retention requirement. As discussed below, the allegation regarding pressure testing of the plastic service lines at 65 Main Street results from the Department's juxtaposition of several provisions of the federal code, none of which are cited in the NOPV, and all of which fall under Subpart L (Operations). Under the federal code, testing requirements for new and reinstated services are governed by Subpart J (Testing Requirements), not by Subpart L.

In terms of operation, the record shows that the normal operating pressure of the service line was below the MAOP that the Company establishes for all plastic pipe on the system (i.e., 60 psig). In terms of testing requirements, the record shows that the Company was not required to retain a record of the testing it performed at the time of

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6 The text of this section of the federal code is provided in Appendix 2 for reference purposes.

7 Under this theory, the Company would have to expect that the Department would issue a NOPV on every plastic pipe segment installed on the system prior to 1980. In 1980, a record retention requirement was imposed at the state level. To date, federal regulation does not require the retention of a pressure-test record for new or reinstated plastic services.

installation. Accordingly, there is no legal or factual basis for the Department's first (and second) allegation and these allegations should be withdrawn.[8]

⇒ Incident Report

As noted in the Incident Report, the Company first installed a bare-steel, one-inch service line at 65 Main Street in 1947. Incident Report at 31. In 1974, the Company inserted a ½-inch plastic service line into the existing one-inch steel service line from the curb valve to the house. Id. In 1979, the Company installed a three-inch plastic main in front of 65 Main Street and a ½-inch plastic service line to connect the three-inch main to the curb valve on the service line to 65 Main Street.[9] Id.

In the NOPV, the Department claims that the Company may be in violation of Section 192.619(a)(2)(i) with respect to the two ½-inch plastic service lines installed in 1974 and 1979 because there are no records of a pressure test being conducted to establish an MAOP prior to these lines being placed in service. NOPV at 2; Incident Report at 7. In the Incident Report, the Department cites to Section 192.603(b) to attempt to support its assertion that the Company was required to retain a record of the pressure test. NOPV at 2; Incident Report at 8. These provisions were not in effect in their current form at the time the service-line segments were installed, and therefore, are not dispositive of the point the Department is attempting to make. In addition, even if

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[8] The second (duplicative) alleged violation in the Department's NOPV relates to Section 192.603(a), which states:

> (a) no person may operate a segment of pipeline unless it is operated in accordance with this subpart;

[9] The insertion of the ½-inch plastic main into the two service line segments constitutes a new service or a "reinstatement" of the service lines because the segments must be disconnected and reconnected to insert the plastic pipe.

applicable, the Department's reliance on this section to demonstrate the record-retention requirements for the pressure testing of plastic service lines is inaccurate and misplaced.

Specifically, Section 192.603(b) of Subpart L (Operations) in the federal code states the following:

> (b) each operator shall keep records necessary to administer the procedures established under § 192.605

NOPV at 2; Incident Report at 7.

The Department notes in the Incident Report that Section 192.605, which is referenced in Section 192.603(b), quoted above, requires that:

> (a) *General.* Each operator shall prepare and follow for each pipeline, a manual of written procedures for conducting operations and maintenance activities and for emergency response.
>
> (b) *Maintenance and normal operations.* The manual required by paragraph (a) of this section must include procedures for the following, if applicable, to provide safety during maintenance and operations.
>
> (1) Operating, maintaining, and repairing the pipeline in accordance with each of the requirements of this subpart and subpart M of this part.

The Department's analysis of these provisions is inaccurate for several reasons. First, it should be noted that these provisions differ from the provisions actually in place at the time of the service installations in 1974 and 1979.[10] Second, all of the sections of the federal code relied on by the Department in the NOPV and Incident Report for the first and second allegations (i.e., sections 192.619(a)(2)(i), 192.603(a) and (b), and 192.605), govern the operation of the service-line segments and do not pertain to the record-retention requirements for pressure testing of new or reinstated mains and services.

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[10] The provisions in place prior to 1991 are provided as Appendix 10.

The federal safety regulation applicable to the testing of a reinstated service line is set forth at 49 C.F.R. § 192.725 ("Section 192.725). This provision states as follows:

> (a) Except as provided in paragraph (b) of this section, each disconnected service line must be tested in the same manner as a new service line, before being reinstated.
>
> (b) Each service line temporarily disconnected from the main must be tested from the point of disconnection to the service line valve in the same manner as a new service line, before reconnecting. However, if provisions are made to maintain continuous service, such as by installation of a bypass, any part of the original service line used to maintain continuous service need not be tested.

49 C.F.R. § 192.725 (emphasis added). Thus, under the federal code, both new and reinstated lines are subject to Subpart J testing requirements. There is no record-retention requirement relating to Section 192.725 (Reinstated Services) under the federal code.

The testing requirements for newly installed service-line segments are found at 49 C.F.R. 192, Subpart J (Test Requirements), which applies to the construction of all bare steel or plastic mains and services. The scope of Subpart J is as follows:

> This subpart prescribes minimum leak-test and strength-test requirements for pipelines.

49 C.F.R. § 192.501. Subpart J further requires that:

> (a) No person may operate a new segment of pipeline, or return to service a segment of pipeline that has been relocated or replaced, until—
>
> (b) It has been tested in accordance with this subpart and § 192.619 to substantiate the maximum allowable operating pressure. [11]

49 C.F.R. § 192.503. The testing requirements for plastic mains and services are set forth in Section 192.513.

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[11] Section 192.619 prescribes the methodology for determining the MAOP.

The record-retention requirements relating to the testing of newly installed service-line segments are set forth in Subpart J, at Section 192.517. The record-retention requirements of this section pertain only to the testing of high-stress pipelines and pipelines operating above 100 psig and not to plastic mains and services. This requirement is as follows:

> Each operator shall make, and retain for the useful life of the pipeline, a record of each test performed under §§192.505 and 192.507. The record must contain at least the following information (list of requirements omitted).

49 C.F.R. § 192.517. The requirements for testing plastic mains and services is set forth in Section 192.513, whereas Sections 192.505 and 192.507 pertain only to the strength and pressure test requirements for high-stress steel mains, reflecting a policy that records be maintained only when a high-pressure system is involved.[12] This regulatory framework has remained unchanged since 1974 and 1979, when the Company installed the two plastic service-line segments in question. Accordingly, there is no federal safety regulation in place now, or in 1974 and 1979, requiring the Company to maintain a record of pressure tests on new or reinstated plastic mains and services.

Moreover, there is no difference in terms of the record-retention requirements existing at the state level in 1974 and 1979. Until 1980, there was no state-level requirement to maintain a record of pressure tests of plastic mains and services. Attached as Appendix 3 is the Massachusetts Gas Distribution Code, D.P.U. 11725-F, issued on

[12] All plastic mains and services installed by NSTAR Gas are tested at the time of installation or reinstatement and are operated at a hoop stress less than 30 percent of 100 psig.

June 15, 1972.[13] Section 1(6)(T) sets forth the Test Requirements for Plastic Mains and Services (based on 49 C.F.R. Section 192.513), which does not include a record-keeping requirement. On December 8, 1980, the Commonwealth added a requirement relating to Test Requirements for Reinstating Service Lines (based on 49 C.F.R. Section 192.725), at Section 1(6)(V), which requires the operator to make and retain a record of each pressure test required under Section 192.725. These guidelines are provided herewith as Appendix 4. Accordingly, there was no state or federal regulation that required the Company to maintain a pressure-test records for plastic mains and services prior to December 8, 1980.

The distinction between "testing requirements," which are applicable to newly installed or reinstated mains and services, and "operating" requirements, which are applicable to mains and services that have been placed into service, is also present in the Company's own distribution-system manuals. As discussed above, the sections of the federal code cited by the Department in the NOPV fall under Subpart L (Operations), and require the Company: (1) to operate the services within the MAOP; (2) to comply with all provisions contained in Subpart L; (3) to develop a manual of written procedures for conducting operation and maintenance activities; and (4) to maintain the records necessary to administer the operation and maintenance procedures set forth in the O&M manual. In accordance with the federal code, these requirements are generally paralleled in the Company's O&M Plan.

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[13] The Company is not able to verify that the Massachusetts Gas Distribution Code in effect as of June 15, 1972 (and presented as Appendix 3) is the precise set of rules in effect in 1974 and 1979 in all aspects. However, there was no change in the record keeping requirement until 1980, as discussed above.

However, the Company's procedures relating to the installation of new mains and services and the reinstatement of plastic services are governed by the detailed procedures set forth in the Company's Gas Standards Manual. The Gas Standards Manual in effect in 1979 is provided herewith as Appendix 5 and the Gas Standards Manual currently in effect is provided herewith as Appendix 6. There is no record retention provision in either manual.

The Gas Standards Manual is divided into two main categories: Construction Standards and Material Standards. All Construction Standards are preceded by the letter "C." The procedures for Service Replacement by Plastic Inserts is designated as Standard No. C-222. The Gas Standards Manual in effect in 1979 and in 2003 were developed consistent with federal and state safety regulations and both manuals list the Pressure Test as a component of the Service Replacement by Plastic insert process. See, Appendix 5, at C-222, page 2 of 6; Appendix 6, at C-222-2/6. Therefore, under the federal regulatory framework, the reinstatement of a plastic service is a construction procedure subject to the testing (and record retention) requirements set forth in Subpart J (Test Requirements), rather than an O&M procedure under Subpart L (Operations). By definition, the requirements of Subpart L pertaining to operations do not apply, unless a main or service has already been tested and placed into service consistent with the provisions of Subpart J.

Lastly, in the Incident Report and the NOPV, the Department fails to mention that the Company has provided the Department with recorded charts and records from the Company's SCADA system showing pressure readings at the regulator stations feeding the Main Street, Hopkinton area. These readings cover the 31-day period of July 2002

and are included in the Incident Report as Exhibit 8. These readings confirm that the Company was operating the system within its operating parameters and below the MAOP of 60 psig.

Therefore, in terms of the first (and second) allegation of the Department, the record shows the following: (1) the regulations cited by the Department as the basis for the first allegation are misapplied because they relate to operating practices and record-keeping requirements relating to O&M procedures and not to the testing of new or reinstated services; (2) the plastic service-line segments at 65 Main Street were installed in 1974 and 1979; (3) at the time the service-line segments were installed, it was the Company's standard procedure to pressure test reinstated plastic services before placing those lines into service; (4) there was no state or federal requirement to maintain a record of that testing in 1974 and 1979; and (5) the Company's historical records confirm that the operating pressure of the distribution system in the Main Street area during July 2002 was below the MAOP and within established operating parameters.

Without a requirement in place to maintain pressure-test records at the point the main or service is installed, the presumption must be the Company adhered to its construction standards, performed the required test and established an MAOP of 60 psig prior to placing the line segments in service.[14] There is no evidence that the Company did not comply with this standard operating procedure, nor does the Department cite to anything other than the lack of a contemporaneous record, which the Company was not required to maintain. Accordingly, there is no basis for the Department to allege that an

[14] It is the Company's standard practice at all times to pressure test new or reinstated lines to establish the MAOP before placing those lines into service. It would be highly unusual for the Company to place a line in service without a pressure test, because the pressure test is a basic and vital step in ensuring that the line is, in fact, ready to be placed in service safely.

MAOP was not established (or adhered to) for the plastic service-line segments at 65 Main Street, and therefore, the Department should withdraw the first and second alleged probable violations.

B. NSTAR Gas Is Not In Violation of 49 C.F.R. Part 192 Requiring the Monitoring and Testing of Atmospheric Corrosion Because This Requirement Does Not Apply to Interior Piping

In its NOPV, the Department claims that NSTAR Gas did not monitor the steel service line in the basement of 65 Main Street for atmospheric corrosion in the five-year period prior to July 24, 2002. NOPV at 2. The Department states that it believes that NSTAR Gas may be in violation of 49 C.F.R. § 192.481, which states:

> After meeting the requirements of § 192.479 (a) and (b), each operator shall, at intervals not exceeding 3 years for onshore pipelines . . . reevaluate each pipeline that is exposed to the atmosphere and take remedial action whenever necessary to maintain protection against atmospheric corrosion.

(emphasis added). Section 192.479(a), which is referenced in the quoted regulation above, provides as follows:

> Each aboveground pipeline or portion of a pipeline installed after July 31, 1971 that is exposed to the atmosphere must be cleaned and either coated or jacketed with a material suitable for the prevention of atmospheric corrosion. An operator need not comply with this paragraph, if the operator can demonstrate by test, investigation or experience that a corrosive atmosphere does not exist.

(emphasis added).

In the Incident Report, the Department confirmed NSTAR Gas did not have an obligation to monitor and protect for corrosion of the exterior pipeline direct buried under Main Street. Incident Report at 28. The Department maintains, however, that NSTAR Gas was required to perform corrosion monitoring and protection of the steel service line in the basement of 65 Main Street. Id. The Department further asserts that NSTAR Gas

failed to produce any records demonstrating that it met the reevaluation requirements of section 192.481 with respect to the metal piping in the basement of the structure. Id. As discussed below, this interpretation is a straightforward misapplication of the federal safety regulation, which does not apply to interior service lines, and tellingly, has never before been interpreted by the Department to apply to interior service lines.[15]

First, as the plain language implies, Sections 192.479(a) and 192.481 require the Company to monitor "aboveground" pipelines installed after 1971 that are "exposed to the atmosphere." As the term implies, "aboveground" means a pipe that is located on or above the surface of the ground, and as such, is subject to outdoor elements that may cause atmospheric corrosion. The service line entering the foundation of the premises at 65 Main Street is buried underground. The Company does not monitor the interior portions of direct buried piping for atmospheric corrosion because it is widely recognized within the gas industry that service-line segments located inside a building are in a protected area not subject to the outdoor elements that can cause corrosion. The Department has acknowledged this fact, stating that:

> The Department regards it as possible that most gas leaks in service lines occur in the segment located between the main and the outer service of the building wall where the service line is more susceptible to corrosive elements. . . . Conversely, the small segment of a service line in a structure generally does not appear to be exposed to the same corrosive elements.

Investigation Regarding the Inactivation, Abandonment and Leakage Survey of Gas Service Lines, D.P.U. 94-142, at 10-11 (1994).

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[15] In the Incident Report, the Department specifically notes that NSTAR Gas responded to the Department's request for corrosion-monitoring records by indicating that it was not required to monitor the steel section of the service line located inside the building at 65 Main Street. Incident Report at 28. However, the Department provides no explanation as to the basis for its interpretation that the requirement applies in this case, despite the fact that this is the first time the Department has ever attempted to apply this regulation to interior piping.

In fact, the Department is aware that this regulation is applied in the gas industry only to exterior pipelines (e.g., pipelines running beneath bridges that are subject to environmental, or atmospheric, corrosion). The Department has performed numerous inspections and audits of the Company's O&M practices, and through those contacts, is aware that the Company monitors and inspects for atmospheric corrosion only on external, aboveground pipelines. The Department has also reviewed the Company's currently effective O&M Manual (as well as its precursors) and the O&M plans of all other gas companies subject to its jurisdiction. There is no provision in the Company's O&M Plan, or any other utility's O&M plan (to the Company's knowledge) that establishes the general practice of performing corrosion monitoring of interior service lines.

The Department is also aware that the Company's O&M procedures relating to atmospheric corrosion are based on the federal safety regulations cited by the Department and that the USDOT does not apply these regulations to interior piping. Significantly, both Sections 192.479 and 192.481 relating to atmospheric corrosion were amended as recently as September 15, 2003. USDOT, Docket No. RSPA-02-13208; Amdt. 192-93. These amendments resulted from a multi-year process aimed at improving the clarity of the regulations and at enhancing the effectiveness of the corrosion monitoring requirements. Although the issue of addressing atmospheric corrosion control of facilities located inside buildings was expressly raised and considered by participants in the proceeding, no amendment was made to the final rule instituting such a requirement. The September 15, 2003 amendments to Sections 192.479 and 192.481, are provided herewith as Appendix 7.

Even if Sections 192.479 and 192.481 were applicable to interior piping, which they are not, the regulations expressly state that an operator need not comply with this paragraph, if the operator can demonstrate by test, investigation or experience that a corrosive atmosphere does not exist. As an operator of the distribution system for over 155 years, it is the Company's experience that interior piping is not subject to atmospheric corrosion, and therefore, monitoring of all interior piping on the Company's system is not necessary or warranted. The Company based this assessment on several factors, including the following: (1) data collected by the USDOT show that corrosion failures on inside meter fits are extremely rare;[16] and (2) the Company's own operating experience over the past 155 years indicating that company-owned equipment located within customer-owned structures are protected from the elements that cause atmospheric corrosion. For example, inside meter set assemblies are installed with a protective housing and are not exposed to weather, wind, salt and industrial effluents, and therefore, it is highly unusual for atmospheric corrosion to occur on interior, company-owned piping.

As noted in the Incident Report, MMR's testing of the Company's equipment located in the interior of 65 Main Street did not detect any atmospheric corrosion. Incident Report at 32. The Department's allegation, despite this finding, that the Company failed to monitor for atmospheric corrosion is: (1) inconsistent with practices nationwide and in the gas industry in Massachusetts; (2) not required by the Company's O&M Plan; and (3) inconsistent with statements and interpretations of the requirement by

[16] The Company has included an analysis of all USDOT incident reports for the period 1985 to April 2003 as Appendix 8. This analysis shows that the total number of incidents in the database is 2715, of which 113 were classified with an "Apparent Cause" being corrosion. Of the 113 incidents classified as being caused by corrosion, only one involved a meter set.

the Department in the past. The Department has never before cited a gas company operating within the Commonwealth for this type of violation. Moreover, even if they applied, the regulations release an operator of the monitoring requirements if the operator can demonstrate by test, investigation or experience that a corrosive atmosphere does not exist.

Accordingly, the Department has fundamentally misapplied the federal safety regulation in positing that it applies to interior service lines, and therefore, should withdraw this alleged probable violation.

C. NSTAR Gas Is Not In Violation of 49 C.F.R. Part 192 Requiring Periodic Business District Leak Surveys Because This Requirement Does Not Apply to Interior Piping

In its NOPV, the Department asserts that NSTAR Gas did not perform leakage surveys of its service line located in the basement of 65 Main Street. NOPV at 3. The Department states that it believes that NSTAR Gas may be in violation of 49 C.F.R. § 192.723, stating:

> (a) Each operator of a distribution system shall conduct periodic leakage surveys in accordance with this section.
>
> (b) The type and scope of the leakage control program must be determined by the nature of the operations and the local conditions, but it must meet the following minimum requirements.
>
> (c) A leakage survey with leak detector equipment must be conducted in business districts, including tests of the atmosphere in gas, electric, telephone, sewer, and water system manholes, at cracks in pavement and sidewalks, and at other locations providing an opportunity for finding gas leaks, at intervals not exceeding 15 months, but at least once each calendar year.

The Department makes the assertion that NSTAR Gas may be in violation of 49 C.F.R. § 192.723 based solely on an interpretation of terms used the Company's O&M Plan and the implication that the O&M Plan requires business-district leak surveys to be

performed "in any area where gas facilities exist." Incident Report at 14. The Department claims that, under the Company's O&M Plan, this "encompasses any building housing NSTAR Gas facilities, including residential structures" and that this interpretation is consistent with the applicable federal regulations. Id. This interpretation is misguided for two reasons: (1) the Department has misconstrued terms in the Company's O&M Manual to support its assertions; and (2) the Department has misrepresented the federal safety regulation for business-district leak surveys. As discussed below, the USDOT does not require interior leak surveys as part of a business-district leak survey as a general practice, nor has the Department prior to the issuance of this NOPV.

First, the Department reached its interpretation that the O&M Plan requires leakage surveys to be performed "where gas facilities exist," by blending defined terms that are applicable to separate sections of the Company's O&M Plan. Attached as Appendix 9 is the Company's relevant O&M procedure, OM-60. The O&M procedure referenced by the Department (OM-60) includes defined terms for leakage surveys, leak classification, action criteria and reporting. See, OM-60, Section 1 (General). Therefore, not all of the defined terms are used in relation to "leakage control."

In particular, the Department applies the generally defined term, "leak survey," to define the scope of the specifically defined "Annual Survey – Business District." Incident Report at 14. Under the general definitions section, "leak survey" is defined as:

> A search for possible gas leakage in any area where gas facilities exist, or where a gas leak is reported or suspected.

OM-60, Section 2(l) (Definition of Terms). However, the term "leak survey" is not even referenced in the section entitled, "Annual Survey – Business District" in the Company's

O&M Plan. See, OM-60, Section 5(c)(Annual Surveys). The Department also refers to the definition of the term "building," noting that the O&M Plan defines a "building" to be "any structure which is normally or occasionally entered by humans for business, residential or other purposes, and in which gas could accumulate." See, OM-60, Section 2(l)(Definition of Terms; Incident Report at 13. However, the term "building" is also not used anywhere in the description of the "Annual Survey – Business District" in the Company's O&M Plan. See, OM-60, Section 5(c)(Annual Surveys).; Incident Report at 13-14. In OM-60, the term "building" is used only in Section 4, entitled "Leak Classification and Action Criteria."[17]

Moreover, the Department notes the fact that the term "business district" is expressly defined in OM-60 as "areas with wall-to-wall paving and/or where the principal commercial activity of the city or town takes place." See, OM-60, Section 2(c). In fact, the Department is aware that, a "business-district leak survey" is considered a term of art in the gas industry, in that it refers to a leak survey that is exactly what the Company's O&M Plan says it is, i.e., an "up to the foundation" survey of areas where the principal commercial activity of the city or town takes place. The Department further asserts that the business-district leak survey "encompasses any building housing NSTAR Gas facilities, including residential structures," but does not provide any explanation on how it reaches this conclusion aside from the interpretation that generally "leak surveys" are

[17] This section would obviously involve leak surveys within a customer-owned structure because it is triggered when the Company has received an odor complaint.

conducted "where gas facilities exist."[18] Accordingly, there is no basis to support the Department's interpretation that the Company's O&M Plan requires business-district surveys to be required wherever "where gas facilities exist," including the interior of a customer's residence.

Based on its flawed interpretation of OM-60, the Department further asserts that the business district leak survey "encompasses any building housing NSTAR facilities, including residential structures" and that this interpretation is consistent with the applicable federal regulations. Id. As the Department is aware, at the federal level, Section 192.723(b)(1) does not require business-district leakage surveys to be performed on interior piping. In Section 192.723(b)(1), there is no explicit or implicit reference to the performance of leak surveys *inside* a building within a business district, the section is drafted entirely in terms of exterior landmarks and outdoor locations, nor does the U.S.D.O.T. interpret there to be such a reference.

The Department has reviewed the Company's currently effective O&M Plan (as well as its precursors) and the O&M plans of all other gas companies subject to its jurisdiction. There is no provision in the Company's O&M Plan, or any other utility's O&M plan (to the Company's knowledge) that establishes the practice of performing business district leak surveys of interior service lines. In fact, OM-60, Section 6(b)(5) sets forth specific leak-survey methods, and nowhere does it mention that business-district leak surveys are performed inside customers-owned structures. The Company's

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[18] Although not stated in the Incident Report, the Department may be interpreting that a business-district leak survey "encompasses any building housing NSTAR facilities, including residential structures" by applying the definition of "leak survey" set forth in OM-60 to Section 192.723, which refers to a "periodic leak survey." However, "business-district" surveys are specifically discussed in Section 192.723(c), and in that section, the terminology refers only to outdoor areas.

O&M regulations are drafted to directly incorporate provisions of the federal safety regulations, and at the federal level, the regulations do not require business-district leak surveys to be performed in the interior of customer-owned structures.

Most significantly, the Department has repeatedly audited the Company's operating procedures, including the business-district leak survey provisions, and has never raised this issue or enforced this regulation in this manner in the past. The Department has investigated this practice in the past, without directing changes to the rules or the utilities' practices, and through discussions with the gas utilities, has acknowledged that it is not currently industry practice to perform such surveys in the interior of buildings within a business district. See, Investigation Regarding the Inactivation, Abandonment and Leakage Survey of Gas Service Lines, D.P.U. 94-142 (1994) The Department is also aware that standard industry practice in Massachusetts to conduct interior leak testing at the time of meter exchanges and in response to odor calls. As a result of this practice, the interior of 65 Main Street was checked for leaks in the months preceding the incident, and none were found. Consistent with this interpretation, the Department has never before cited a gas company operating within the Commonwealth for this type of violation.

The Department's allegation that the Company failed to perform business-district leak surveys on the service line located inside 65 Main Street is: (1) not required by the Company's O&M Plan; (2) inconsistent with practices at the federal level and in the industry within Massachusetts; and (3) inconsistent interpretations of the requirement by the Department in the past. Therefore, in its Incident Report and NOPV, the Department has both misconstrued provisions of the Company's O&M Plan and misapplied the

federal safety regulation in positing that it applies to the interior service line. Therefore, there is no basis for the Department to allege that the Company may be in violation of Section 192.723, and the NOPV should be withdrawn.

D. NSTAR Gas is Not In Violation of 49 C.F.R. Part 192 Requiring A Pipeline Operator to Comply With Its O&M Plan Because the Department Has Misinterpreted the Company's O&M Plan

As discussed above in subsections (A), (B) and (C), the "probable violations" alleged by the Department are merely contrived misapplications of federal safety regulations that have no precedent or foundation in Department practice. Therefore, the Department's parallel assertion that the Company has operated the system in a manner that is inconsistent with its O&M Plan is without merit.

Respectfully submitted,

NSTAR GAS COMPANY

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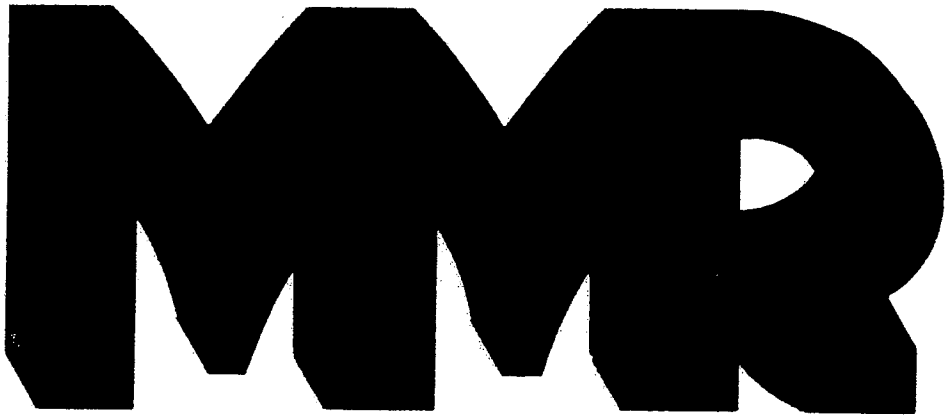
Dated: December 10, 2003

Analysis of Jurisdictional Gas Piping and Appurtenances Removed From 65 Main Street, Hopkinton, Massachusetts

Volume I (Text)



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REPORT TO:

The Department of Telecommunications and Energy
Boston, MA

Attn: Mr. Robert Smallcomb, Jr.

Analysis of Jurisdictional Gas Piping and Appurtenances Removed From 65 Main Street, Hopkinton, Massachusetts

MMR Project No. J4471

August 8, 2003

From
Massachusetts Materials Research, Inc.

James J. Scutti, P.E.
Technical Director

Veda-Anne Ulcickas
Materials Engineer

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BACKGROUND

On 24 July 2002, the house located at 65 Main Street, Hopkinton, Massachusetts, was destroyed in an explosion due to an apparent natural gas leak. Pursuant to state and federal law, an investigation was opened by the Department of Telecommunications & Energy (DTE), and, to the extent appropriate pursuant to federal regulations, in association with the operator of the jurisdictional piping, NSTAR Electric and Gas Corporation (the provider for natural gas service at 65 Main Street, Hopkinton), see Appendix A. Massachusetts Materials Research, Inc. (MMR) was selected to perform the testing associated with this technical investigation. Massachusetts Materials Research, Inc. (MMR) obtained piping, meters, a regulator, associated fittings, and various appliances recovered from the building from the Massachusetts State Police.

This investigation focuses on piping and appurtenances within the DTE's jurisdiction. Background provided by NSTAR includes the information that gas pressure upstream of the regulator located in the basement of 65 Main Street, Hopkinton, was 57 psi prior to the explosion. The gas pressure downstream of the regulator was 10 to 12 inches of water column (in/H_2O). The regulator was reported to be set for 13 inches of water column as the trip pressure for outlet venting.

Throughout this report, the various parts investigated are referred to by their MMR ID numbers. These items were tagged with these numbers upon receipt by MMR. Table I below lists the items from 65 Main Street, Hopkinton, in the custody of MMR.

Table I
Items from 65 Main Street, Hopkinton, in Custody of MMR

MMR ID	Description
1	Water pipe ½" with Watts regulator reportedly part of Utica boiler.
2	Flue pipe 6" reportedly from Utica boiler.
3	Water pipe ½" with sprinkler head.
4	Water pipe ½" with check valve.
5	Gas pipe from basement.
6	Gas meter #5070 and associated ¾" piping and ¼-turn gas valve.
7	Gas meter #0965.
8	Gas meter #21571.
9	1" gas pipe with 1" x ¾" tee.
10	1" gas pipe with tee and swivel nut.
11	Piping assembly with two meters, #4231 and #5220, and two meter valves, with associated ¾"and 1" piping, regulator, portion of relief pipe, service line valve and downstream portion of transition fitting.
12	1" foundation sleeve.
13	PVC piping with union, rubber compression sleeve and threaded end.
14	Regulator relief piping that protruded through sill of house.
15	Piece of regulator relief valve piping, ½".
16	Sump pump.

Table I (continued)
Items from 65 Main Street, Hopkinton, in Custody of MMR

MMR ID	Description
17	½" plastic service line, manufacturing by Drisco.
18	½" plastic service line, manufacturing by Drisco, with transition fitting (upstream portion).
N/A	Utica oil fired boiler.
N/A	Weil-McLain gas fired boiler.
N/A	Gas fired hot water heater.
N/A	Gas fired boiler.
N/A	New, unused transition fitting (slightly different configuration than other transition fittings described herein (not from 65 Main Street, Hopkinton).
A	Exemplar transition fitting and associated piping, removed from service (not 65 Main Street, Hopkinton).

Items #5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 17 and 18 are the jurisdictional materials that were analyzed in this investigation.

INVESTIGATION

To facilitate the investigation of the piping and appurtenances under the DTE's jurisdiction, a procedural conference was held on 4 December 2002, at MMR's West Boylston facility. The purpose of this procedural conference was to present the testing protocol for the investigation. A comment period followed wherein input from all interested parties participating in the conference was reviewed. The working protocol was developed from the preliminary protocol and the comments. The investigation began on schedule on 6 January 2003. Table II below outlines the protocol used to guide this investigation. Please note that Protocol Item Numbers and MMR ID Numbers are different. MMR ID Numbers refer to the recovered items listed in Table I and are designated "MMR #" in the report text. Protocol Items refer to testing and evaluation descriptions listed in Table II and are designated "Protocol Item" in the report.

Table II
Hopkinton Gas Pipe Investigation
Test and Evaluation Protocol

(Revised 31 December 2002)

ITEM	DESCRIPTION	PURPOSE
1	Visual inspection, photography, dimensional measurements, and identifying mating pipe segments.	Document condition, dimensions and relationships between pieces.
2	Radiographic inspection of selected components, including regulator and transition fitting.	Document internal conditions of components.
3	Perform leak tests on individual pieces with nitrogen gas at line pressure. Note: this will be carried out to the extent possible without tearing down or cutting any piping assembly.	Identify potential for leakage.
4	Perform either nitrogen gas flow testing on separated regulator relief piping (MMR ID #14 and #15), or other evaluation(s) to determine whether or not obstructions exist. Other evaluations can consist of, but are not limited to, x-ray data, visual inspection, etc.	Determine if obstructed.
5	Regulator pressure testing. <u>Set-up:</u> Decouple regulator piping from MMR ID #11 at the riser union downstream of the regulator. Decouple the "T" containing the Posilock transition fitting piece on the upstream side of the regulator riser pipe. Attach pressure gauge and flow meter to upstream end of riser pipe. Attach pressure gauge at riser union. Attach flow meter to regulator relief pipe. <u>Test 1:</u> Pressurize system to 57 psi upstream of regulator. Record pressure at downstream gauge, and flow, if any, at relief pipe. <u>Test 2:</u> Increase upstream pressure to the regulator trip pressure. Record resultant pressures and flows as per Test 1, above. These tests will also serve to determine whether or not the relief piping is blocked.	Functional check.
6	Perform leak tests with nitrogen gas on two exemplar transition fittings that have been modified to simulate the condition in which the transition fitting from the incident was found.	Identify potential for leakage.
7	Perform flow test through plastic tube end of transition fitting, using nitrogen gas at line pressure.	Determine flow rate through ½" plastic pipe.

Table II (continued)
Hopkinton Gas Pipe Investigation
Test and Evaluation Protocol

(Revised 31 December 2002)

ITEM	DESCRIPTION	PURPOSE
8	Examine separated ends of transition fitting from the incident with binocular microscope, photodocument. As required, cut-off and prepare for Scanning Electron Microscope (SEM) examination in conjunction with Energy Dispersive X-ray Spectroscopy (EDS).	Determine the conditions of the mating surfaces and the threaded pieces of the transition fitting.
9	Perform leak test on recovered fitting. Procedure, Part 1: Cap off the remnant of the "T" containing the downstream Posilock fitting piece. Slide the plastic tubing (MMR ID #18) into the foundation sleeve (MMR ID #12). Attach a flow meter and pressure gauge to the upstream end of the tubing. Slide the tubing/stiffener assembly into the Posilock transition fitting remnant from MMR ID #11 until the stiffener shoulder bottoms out on the integral ledge of the fitting remnant. Stabilize assembly to prevent movement. Pressurize set-up to 57 psi. Record any flow. Procedure, Part 2: Decouple plastic tubing (MMR ID #18) and foundation sleeve assembly from MMR #11. Attach a flow meter and pressure gauge to the upstream portion of the fitting remnant on MMR #11 with a compression fitting. Pressurize to 57 psi. Record any flow past the weld portion of the fitting.	Identify potential for leakage.
10	Cut seat end of transition fitting from the incident to remove rubber o-ring gasket. Analyze o-ring gasket for composition, hardness, degradation. Conduct similar analysis on exemplar and/or new transition fitting.	Characterize o-ring gasket material from transition fitting.
11	Cut and prepare metallurgical cross section of threaded portion of seat end of transition fitting from the incident. Evaluate material for material condition, degradation.	Characterize material on threaded portion on seat end of transition fitting.
12	Perform chemical analysis of threaded portion of seat end of transition fitting from the incident.	Determine composition.
13	Cut and prepare metallurgical cross section of threaded portion of plastic tube end of transition fitting from the incident. Evaluate material for composition, material condition, degradation.	Characterize material on threaded portion on tube end of transition fitting.

Table II (continued)
Hopkinton Gas Pipe Investigation
Test and Evaluation Protocol

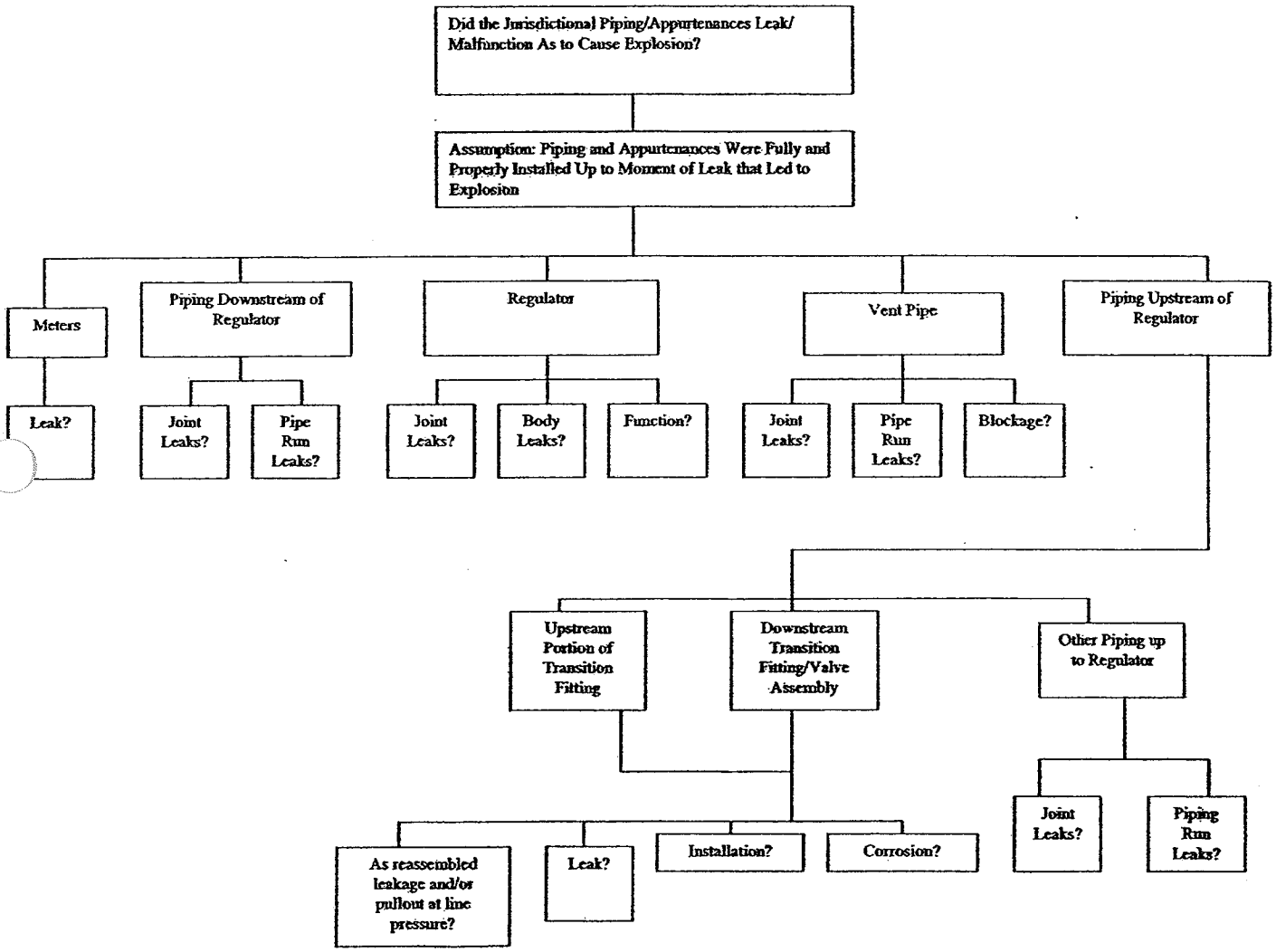
(Revised 31 December 2002)

ITEM	DESCRIPTION	PURPOSE
14	Perform chemical analysis of threaded portion of tube end of transition fitting from the incident.	Determine composition.
15	Examine all broken pipe ends using binocular microscope. As appropriate, cut-off fractured portions of pipe and prepare for fracture analysis in SEM. Examine fractures in SEM and analyze by EDS, as required.	Characterize fracture surfaces.
16	As required, cut through fractures and prepare metallurgical cross-sections. Examine.	Evaluate structure of metal adjacent to fractures.
17	As required, perform chemical analysis of fractured pipe pieces.	Determine composition.

As the investigation progresses, we may identify additional tests and/or modify the tests planned.

A common method of organizing a large investigation such as this is the construction of a fault tree to aid and guide the analysis, to help develop investigative protocols, and to define the reasonably probable failures that could occur in a system. The fault tree used to develop the test and evaluation protocol is illustrated below.

"Reasonably probable" is a term used during the construction of a fault tree to distinguish between fanciful failure explanations and those that could actually occur.



RESULTS

Protocol Item 1: Visual Inspection, etc.

The jurisdictional piping and appurtenances were visually inspected in detail. The results of the visual inspection, dimensional measurements, and identification of mating pipe segments are described below.

Visual examinations and dimensional measurements were carried out simultaneously. Again, this investigation focuses solely on piping and appurtenances within the DTE's jurisdiction, so descriptions and photographs of every item mentioned in Table I are not included here.

MMR #5 is shown in Figures 1 and 2. It consists of a bent section of pipe with an overall length of approximately 3 feet eight and a half inches, an approximate outer (OD) of 1.06 inches and an approximate inner diameter (ID) of 0.822-inches. This corresponds to 1-inch piping. This bent section of pipe is attached to a 90° elbow with an approximate 1.39-inches OD. Some white fibrous material clung to the pipe OD at one place in the bend region. Some similar fibrous substance is present on the 90° elbow in one patch. The open end of the elbow possesses a fractured piece of pipe in the threaded portion. The pipe end not threaded into the elbow possessed a cut end.

MMR #6 is shown in Figures 3 and 4. This item consists of gas meter #5070 (Serial Number Q005070) and associated piping and valves. The meter reads 6763 ft^3. A valve made of a cupric (copper-based) material is present the inlet port of the meter, attached with fittings. The end of the valve not piped to the meter contains a fracture. The outlet port of the meter is piped with a "T" fitting. The in-line portion of the "T" fitting leads to a 90° elbow. This elbow contains a fractured piece of piping threaded into it. The perpendicular port of the "T" fitting contains a valve with a blue handle. The valve handle indicated that it was in the "open" position upon receipt at MMR. Two 90° elbows then lead to a section of ¾-inch piping approximately 35-inches long. The end of the 35-inch length of piping not plumbed to the meter possesses a fracture.

MMR #7 is shown in Figure 5. This piece consists of gas meter #0965 (Serial Number W000965) and a fitting with a pipe section at the meter outlet. The meter reads 6953 ft^3. The inlet port of the meter had sustained damage and fracture surfaces are present on the meter's housing at the inlet port location. The fitting at the meter outlet is connected to a small piece of ¾-inch piping that is approximately 1½-inches long. The end of this pipe not plumbed to the meter contains a fracture surface at the threads.

MMR #8 is shown in Figure 6. This item consists of meter #21571 (Serial Number Q021571) with associated piping pieces and valve. The meter reads 7833 ft^3. At the inlet port, a fitting and valve assembly are attached. The valve was in the open position upon receipt at MMR. At the outlet port, a fitting is attached to a small S-shaped piece of ¾-inch piping approximately 1 5/8-inches long. The end of the S-shaped pipe not plumbed to the meter possesses a fracture.

MMR #9 is shown in Figure 7. This item consists of a section of 1-inch pipe with a "T" fitting attached at one end. The pipe section is approximately 7 5/8-inches long. The end not threaded into the "T" fitting possesses no fracture surface. This end does, however, possess a longitudinal crack in the threads through approximately three threads. This crack is in the line with the pipe seam. Some thread deformation is present near this crack and presents a shiny metallic surface. The perpendicular port of the "T" fitting possesses the remnant of a cupric pipe fracture.

MMR #10 is shown in Figure 8. This item consists of a section of 1-inch piping approximately 10 ¼-inches long attached to a "T" fitting. A fractured piece of piping is present in the port of the "T" fitting that is in line with the 10 ¼-inch section of pipe. A cupric fitting remnant is present on the perpendicular port of the "T" fitting. Approximately three quarters of this cupric fitting is present and attached to MMR #10. The rest is not present on this item. It appears that this cupric fitting remnant had a hexagonal outer geometry. This fitting remnant's appearance is consistent with the appearance of the cupric valve on the MMR #6 meter inlet. The remnant present here is not straight; it is bent toward the attached piping. The "T" fitting, on the side from which the cupric fitting appears whole, possesses a scuff mark.

MMR #11 is shown in Figures 9 through 19. This item consists of two meters depicted in Figures 9 and 10: #4231 (Serial Number Q004231) and #5220 (Serial Number W005220), a regulator (Figure 10), a portion of a Posilock transition fitting and valve assembly (Figures 13, 14, and 15), and associated piping, fittings, and elbows. The meters read 8199 ft^3 and 6548 ft^3, respectively. Both meters posses similar piping and remnants at their inlet and outlet ports. Both possess a fitting and S-shaped length of ¾-inch piping at their outlet ports. The similarities between their inlet portion piping and valve arrangements can be seen in Figure 10, where a 90° elbow leads to a cupric valve (handles show "open" position), a bracket, and an S-shaped fitting and nut assembly. Both 90° elbows attach to the perpendicular port of respective "T" fittings. A 14-inch length of 1-inch piping runs between the two "T" fittings and attaches the meter assemblies to each other so that meter #4231 is downstream of meter #5220. One port of the "T" fitting to which meter #4231 and its associated piping is attached contains a fractured portion of 1-inch pipe. This fracture is in line with the 14-inch length of 1-inch piping that connects the meter assemblies.

The "T" fitting to which the meter #5220 assembly is attached is connected via a small (approximately 3-inch long) 1-inch pipe segment to a 90° elbow. This 90° elbow attaches to a piping assembly referred to as the "riser pipe". The riser pipe consists of an approximately 9-inch long section of 1-inch piping coupled with a "riser union" to an approximately 20-inch long section of 1-inch pipe. This 20-inch long section of pipe mates to the regulator.

The regulator vent port is connected to an assembly of elbows and pipe segments that reportedly led to the overpressure vent of 65 Main Street, Hopkinton. This assembly can be seen in Figure 11. The inlet port of the regulator is connected to a further segment of riser pipe that is approximately 20½-inches long. From there, a 90° elbow leads to a "T" fitting assembly that possesses a threaded cap on one end, and a valve attached to a portion of a Posilock transition fitting on the other. This assembly can be seen in Figure 13.

This assembly (i.e., MMR #11) is not entirely plumb and square. The 14-inch length of piping connecting the two meter assemblies is bent slightly at the "T" fitting to which meter #5220 is attached. This bend is located at the downstream port of the "T". Also, as Figures 11 and 12 show, a bend is also present at the riser pipe union.

As Figures 13, 14, 15, and 16 show, the "T" assembly containing the Posilock transition fitting possesses more severe corrosion than the rest of MMR #11. The surface pitting that is present here is visible in gradually decreasing amount and severity up to approximately 18-inches up the riser pipe. The pipe OD then possesses a generally rusty appearance from approximately 4 to 6-inches upstream of the regulator to approximately 8-inches downstream of the regulator. Downstream of this, the piping possesses a general black iron OD surface with a very light rusty bloom. The wall of the 90° elbow nearest the Posilock fitting is more corroded that the side with an integral "G" marking, Figures 17 through 19. The pipe segment leading from this elbow to the "T" fitting to which the Posilock fitting is attached also possesses a longitudinal rub-mark in its OD corrosion, Figure 16. If the riser pipe of MMR #11 was truly vertical in position just prior to the 24 July 2002 incident, then this longitudinal discontinuity is located at what would have been the 11 o'clock position on this pipe segment. Note also that the upstream threads of this segment appear filled in with a rusty-beige-colored debris consistent in appearance with the longitudinal rub-mark.

MMR #12 is shown in Figure 20. This item consists of a piece of 1-inch piping approximately 36-inches long. A missing portion of the pipe wall at one end is approximately 8¼-inches long. This missing portion of the pipe has corroded edges and was located at the 6 o'clock position in service, according to DTE photographs of the aftermath of the 24 July 2002 explosion. This pipe is the piece known as the "foundation sleeve", or the piece of piping that entered the basement wall of 65 Main Street. This type of piping was typical of gas service piping dating from the 19th and early 20th centuries. The polymer tubing service line/transition fitting assembly reportedly replaced this pipe in carrying natural gas into the house approximately 25 years ago.

Overall, this is a heavily corroded length of pipe with corrosion tubercules, flaking debris, and longitudinal debris cracks. The OD of this pipe possesses adherent debris with mixed yellow-orange and grey-brown coloring. The exposed ID of the pipe at the ragged (non-cut) end possesses a general layer of heavy corrosion with glassy-looking, red-brown colored tubercules.

MMR #14 is shown in Figure 21. This item consists of two pieces of piping joined by a female fitting and capped on one end with a 90° elbow. The end of the piping with the elbow protrudes through a wooden assembly reported to be a portion of the sill of 65 Main Street. The elbow has on it some red paint that matches closely in color with that on one side of the sill portion.

The upstream pipe OD is a brownish-red color. The exposed thread end of the upstream pipe possesses thread deformation and a fracture surface. The fitting and downstream pipe ODs are grey. The downstream pipe has a whitish bloom near where it passes through the house sill. The 90° elbow on the outer side of the sill prevents the piping assembly from being drawn toward the inside of the house. Nothing on the inside of the pipe assembly provides an analogous stop to its being drawn from inside to outside.

MMR #15 is shown in Figure 22. This item consists of two 90° elbows with an approximately 3-inch length of ½-inch piping assembled in an "S" configuration. Both open ends of the elbows possess fractured portions of pipe located in their threads. The outer surfaces of all three pieces present a generally uniform red-brown coloring with a light corrosion bloom.

MMR #17 is shown in Figure 23. This item is an approximately 17½-inches long piece of ½-inch tubing of the same appearance as that attached to MMR #18. This item is reported to be from the 65 Main Street service and to have been manufactured by Drisco. The tubing material is black polymer covered in regions with a powdery orange-colored substance.

MMR #18 is shown in Figure 24. This item consists of an approximately 21½-inches long piece of ½-inch black polymer tubing attached to a heavily corroded metallic fitting. The tubing has orange-colored and brownish powdery debris in regions along its OD.

The fitting is heavily corroded and appears to possess remnants of a mating female piece at its male threads. Opposite the threads, both fitting and tubing possess a grey-brown powdery debris consistent in appearance with dirt.

At the threaded end of the fitting, a part clasps the tubing OD. This part appears to be the cupric ring seen in a new, unused exemplar provided by NSTAR. The recovered cupric ring possesses an orange-brown circumferential ring consistent in appearance with rust. Inside the tubing stiffener, a white crumbly deposit is evident. A white debris bloom is also present on the part that clasps the tubing OD, approximately 180° from the stiffener ID deposit. No such white deposits are visible at the cut end of the tubing.

Overall, the piping and appurtenances examined in Protocol Item #1 possessed loose debris consistent with dirt, dust, or pulverized cement adhered sporadically to various regions of the items. The piping was consistent in appearance with lightly corroded ferrous material with the occasional green-tinged cupric fitting, except for the "T" fitting region containing the Posilock transition fitting and the 1-inch foundation sleeve. This "T" region was pitted and generally corroded. Both upstream and downstream portions of the Posilock fitting were covered with a friable layer of corrosion.

Based upon DTE photographs of the bottom of a water tank removed from the basement of 65 Main Street, the presence in Table I of a sump pump from the house basement, and the information that the foundation of this house was stone, MMR believes that the basement was a humid, and at times wet, environment. Photographs of the foundation sleeve show a heavily corroded pipe with a portion of its wall missing in the 6 o'clock position (as installed in-service). Water seeping into the basement along this foundation sleeve and collecting to drip from the bottom (or 6 o'clock position) would produce this type of missing wall pattern through corrosion and gradual material wastage over time. This is also consistent with the corroded appearance of both transition fitting pieces and the "T" assembly to which they were in contact during service. Incoming water would have a much more difficult time running upwards onto a vertical basement riser pipe; however, and the piping and meters on the rest of MMR #11 show markedly less corrosion than the transition fitting and other items near the gas inlet that were oriented in a horizontal way during service.

This protocol item also included the identification of mating pipe segments. This portion of the investigation used visual inspection, a hand-held magnifying lens, and a binocular microscope to identify mating features on the fractured pipe ends. The resulting mating couples were discovered:

- #9 Male Threaded End mates to #11 Meter Inlet Manifold Tee Fitting,
- #15 Elbow Fitting Mates to #14 Male Threaded End,
- #18 Upstream Side of Transition Fitting mates to #11 Downstream Side of Transition Fitting,
- #9 1-inch Fitting End Tee Mates to #10 Male Threaded End,
- #9 ¾-inch Tee Branch Mates to #6 Inlet Valve Male End.

Protocol Item 2: Radiographic Inspection

Radiographic (x-ray) inspection of MMR #5, 6, 7, 8, 9 10, 11, 14, 15, and 18 was performed to reveal any internal blockages within the piping system, internal details of the regulator and meters, and details of thread engagement and other joints. Figures 25 and 26 show details of the locations of the radiographic shots of MMR #5, 6, and 11. All other pieces were shot at 0° and 90° positions.

No gross internal defects were revealed by this examination. No blockages were revealed by this examination. No gross threading anomalies (i.e. cross-threading of pieces) were revealed by this examination. All threaded joints examined possessed a minimum of three fully engaged threads. Many possessed five or more fully engaged threads.

The welded joint of the downstream portion of the transition fitting (the portion of the fitting attached to MMR #11), however, revealed an anomaly. This examination revealed what appears to be a slight lack of penetration or lack of fusion in the weld region, as well as revealing that the joint itself is slightly off center. This result necessitated some modification to the leak testing protocol for this portion of the fitting in order to accommodate the need to leak test the welded joint.

Protocol Item 3: Leak Testing

Leak testing of items MMR #6, 8, 9, 10, 11, 17 was performed. Bottled nitrogen gas was used at an inlet pressure of 57 psig for those items located upstream of the regulator on MMR #11, and an inlet pressure of 10 to 12 in/H_2O (inches of water column) for those items located downstream of the regulator on MMR #11. Leaks were detected using soapy water, droppered onto areas being evaluated.

The leak testing set-up for MMR #6 is shown in Figures 27 through 29. The inlet nitrogen pressure ranged from 10 to 13 in/H_2O. No leaks were detected.

The leak testing set-up for MMR #8 is shown in Figure 30. Prior to plumbing the nitrogen to the meter inlet, a small piece of debris was removed from the inlet valve, Figures 31 and 32, and saved. The inlet nitrogen pressure ranged from 10.5 to 12 in/H_2O. No leaks were detected.

The leak testing set-up for MMR #9 is shown in Figure 33. The inlet nitrogen pressure ranged from 11 to 11.5 in/H_2O. A small leak was detected at the "T" fitting in line with the pipe. This leak was not past the pipe stopper, but originated between the "T" fitting and a threaded-in remnant present in the joint upon receipt at MMR, Figure 34.

The leak testing set-up for MMR #10 is shown in Figure 35. The inlet nitrogen pressure ranged from 10.25 to 11.5 in/H_2O. A small leak was detected at the "T" fitting in line with the pipe. This leak was not past the pipe stopper, but originated between the "T" fitting and a threaded-in pipe remnant present in the joint upon receipt at MMR, Figures 36 through 38.

The leak testing set-up for MMR #11 is shown in Figure 39. The majority of the plumbing was set into place prior to the removal of the transition fitting from the assembly. The removal of this fitting was necessary because a direct plumb of equipment to allow MMR #11 to be pressurized from the fitting would have damaged this portion of the fitting. To preserve it for further study, it was removed from the MMR #11 assembly, Figures 40 through 42. Some debris was present in the piping at the valve joint that separated, Figures 42 and 43. This debris was removed and saved. The valve attached to the transition fitting was in the open position upon removal, Figure 44. Figure 45 shows the resulting inlet plumbing flow meter and gauge set-up. Figure 46 shows the outlet gauge used to reference the outlet pressure.

The inlet pressure for this test was 57 psi. There were three small leaks detected. One was at a joint in the inlet piping to meter #4231, Figures 47 and 48. This leak, Figure 48, was located at the threaded joint at a 90° elbow and the nipple leading to the inlet valve. The leak was on the side of the joint that faced downstream.

Two other leaks were located at joints in the inlet piping to meter #5220. One was located at the threaded joint of a 90° elbow and the nipple leading to the inlet valve, Figure 49. This leak was analogous to the one detected at the other meter piping, only this one was on the side of the joint that faced upstream.

The second leak in the meter #5220 piping was located at the "T" fitting at the perpendicular port, Figure 50. This leak was on the side of the joint that faced the meter.

All three leaks were very small and produced a fine-bubbled froth that was not raised instantaneously. This indicates that they were very slow leaks that bled off a very low amount of nitrogen.

No other leaks were detected on the MMR #11 assembly.

The leak testing set-up for MMR #17 is shown in Figure 51. The inlet pressure for this test was 57 psi. No leaks were detected.

In general, the leaks detected during the course of Protocol Item #3 were small and located in regions that would be susceptible to damage in an explosion.

Protocol Item 4: Flow Testing or Other Evaluation to Determine Obstructions

Nitrogen gas flow testing and other evaluations were performed on MMR #14 and #15 to determine whether or not they were obstructed.

MMR #14 was unobstructed by visual examination. A flashlight placed at the relief pipe outlet (90° elbow at the house sill) cast observable light that could be viewed from the upstream side of the item. No foreign material was observed in the piping.

MMR #15 elbows were unobstructed by visual examination. Compressed nitrogen gas flowed freely through the pipe segment.

A review of the radiographs of both items confirms no obstructions.

Protocol Item 5: Regulator Pressure Testing

Pressure testing was performed on the regulator to determine whether it functioned (i.e., whether it regulated gas pressure as required, and vented gas during a downstream overpressure event). To facilitate performing this test, the riser pipe union downstream of the regulator was decoupled. Figures 52 and 53 show the match marks placed at that region, and Figures 54 and 55 show the separated pieces. The lightly corroded interior and face of the upstream side of the riser pipe and fitting are shown in Figures 56 and 57. Likewise, Figures 58 and 59 document the lightly corroded interior of the downstream side and fitting. Finally, Figures 60 through 62 show the removal of the fitting from the upstream side piping.

Figure 63 shows the set-up for this regulator test. A pressure gauge and flow meter (50 CFH capacity) were fitted to the riser pipe downstream of the pressure regulator. A shut-off valve was plumbed between the riser pipe and the gauge/flow meter assembly to prevent overpressure spikes during testing start-up. A flow meter (0-4 CFH capacity) was fitted to the vent pipe.

With the downstream valve closed, the inlet pressure was brought gradually up to 57 psi. No flow was observed out the vent pipe.

With the downstream 50CFH flow meter shut, the downstream shutoff valve was opened. The downstream gauge measured 10.5 in/H_2O under these static conditions.

The flow meter was then gradually opened, simulating flow of gas during household usage of appliances. Once the system stabilized, the flow was measuring 43 to 43.5 on the 0 to 100 scale of the flow meter (the scale is the calibrated reading, and a conversion chart is provided with each of these flow meters for conversion to more handy units of *air* flow). The calibration correlation factor of 1.02 was applied to the flow readings, to convert the air flow data to nitrogen flow data. This scale reading corresponds to approximately 21 CFH. The downstream pressure gauge measured 12 in/H_2O under these flowing conditions.

While this testing was underway, a leak check was performed on the system. No leaks were detected.

When the system stabilized under flowing conditions, the valve on the downstream flow meter was gradually shut off. Once it closed completely, the pressure on the downstream pressure gauge read 10.5 in/H_2O. As the downstream flow meter valve was closing, the vent pipe flow meter simultaneously began reading an initial flow rate of approximately 0.36 CFH which then decayed to approximately 0.1 CFH, followed by a slow decay to zero. After approximately ten minutes, the system had stabilized with no flow at the downstream flow meter, no flow at the vent pipe flow meter and a downstream pressure reading of 11.5 in/H_2O.

The preceding test verified that the regulator would vent under increasing downstream pressure, and provided some quantification to the vent pipe flow rate. However, in reality, gas service vent pipes are not typically subjected to the flow necking effects of a flow meter. Also, a downstream pressure source is needed to mimic steadily increasing downstream pressure beyond what simply closing off a flow meter can produce.

For the second portion of this test, a downstream pressure source was plumbed in between the downstream pressure gauge and the downstream flow meter, Figure 64. Initially, the vent pipe flow meter was retained to provide quantified vent flow readings. Later, it was removed to eliminate the normal flow restriction inherent with the flow meter. Further, operation without the flow meter simulated actual conditions, since the vent pipe was reported to be unobstructed in service and was found to be unobstructed during testing at MMR. The following data tables were obtained during this round of testing.

Table III
Downstream Overpressure Testing, 0-4 CFH Vent Pipe Flow Meter

Test	Inlet Pressure psi	Downstream Pressures in/H$_2$O	Vent Flow, % Scale	Vent Flow, CFH
Downstream Overpressure Testing	57	12	0	0
	57	14 1/3	1	0.02
	57	15½	4	0.04
	57	15¾	2–3	0.02 – 0.03
	57	16	8-10	0.10 – 0.15
	57	16¼	12-13	0.21 – 0.24
	57	16½	18-19	0.40 – 0.43

The test was then stopped to change the vent pipe flow meter to a more sensitive scale measuring from 0-2.2 CFH. The test was then repeated. Upon system stabilization with the inlet flow at 57 psi and the downstream pressure initially at 12¼ in/H_2O, the following readings were obtained.

Table IV
Downstream Overpressure Testing, 0-2.2 CFH Vent Pipe Flow Meter

Test	Inlet Pressure psi	Downstream Pressure in/H$_2$O	Downstream Flow, % Scale, CFH	Vent Flow, % Scale, CFH (Spike)	Vent Flow, % Scale, CFH (Stabilized)
Downstream Overpressure Testing	57	12¼	62, 33.28	0	0
	57	12½	61, 32.64	0	0
	57	12¾	61, 32.64	3, 0.01	0-2, 0-0.007*
	57	13	60, 31.77	0-5, 0-0.02	0
	57	13¼	59-60, 31.12 - 31.77	5, 0.02	0-1, 0-0.005
	57	13½	59, 31.12	7, 0.03	0-2, 0-0.007*
	57	13¾	59, 31.12	0	0
	57	14	59, 31.12	7, 0.03	0-2, 0-0.007*
	57	14¼	59, 31.12	5, 0.02	0-1, 0-0.005*
	57	14½	58.5, 30.79	6, 0.02	0-1, 0-0.005*
	57	14¾	58.5, 30.79	0	0
	57	15	58.5, 30.79	7, 0.03	2-4, 0.007-0.01
	57	15¼	58, 30.48	----	8, 0.03
	57	15½	57.5, 30.15	16, 0.11	15, 0.09
	57	15¾	56, 29.17	----	24-25, 0.23-0.24
	57	16	54, 27.88	----	32, 0.37
	57	16¼	52, 26.58	40, 0.53	36, 0.45
	57	16½	50, 25.29	45, 0.63	44, 0.61
	57	16¾	47, 23.34	----	49, 0.71
	57	17	45.5, 22.48	----	53, 0.81
	57	17¼	42.5, 20.66	59, 0.96	55, 0.86
	57	17½	39.5, 18.88	62, 1.03	59, 0.96
	57	18	34.5, 15.98	78, 1.48	65, 1.11
	57	19**	22, 9.27	82, 1.60	73, 1.34
	57	20**	6.5-7, 2.47 – 2.66	----	84, 1.66
	57	20.5**	0	----	98-100, 2.06 – 2.12

*These readings subsequently decayed to 0.
**This pressure could not be maintained as the regulator would vent too rapidly.

When the vent flow meter was disconnected to render the vent pipe unobstructed, flow could be felt out the vent pipe upon application of downstream pressure from the downstream nitrogen tank. Also, a distinct "natural gas" odor could be detected in the immediate region of the vent pipe outlet.

Since no flow meter was present on the vent pipe, no back pressure was present on the relief system and a more accurate measurement of the downstream pressure could be obtained. The results of this testing are summarized in Table V below.

Table V
Downstream Overpressure Testing, No Vent Pipe Flow Meter

Inlet Pressure, psi	Downstream Flow, % CLIM	Outlet Pressure, in/H2O
57	73, 41.07	12¼
57	70, 38.90	13
57	68, 37.39	13½
57	66.5, 36.41	14
57	62.5, 33.61	15
57	47, 23.34	16
57	0	17 (decaying)

The results of this testing indicate that the vent pipe is not blocked and that the regulator begins to vent at approximately 12¾ in/H_2O downstream pressure.

Protocol Item 6: Exemplar Modification and Testing

Leak testing was performed on an exemplar transition fitting reported to be of the same general age as the recovered fitting. This exemplar fitting was removed from service (not from 65 Main Street, Hopkinton).

Prior to commencing leak testing, the exemplar fitting had to be detached from its associated valve and piping. This was accomplished without disturbing the exemplar fit-up. Figures 65 through 70 show the labels and match marks on this fitting prior to detachment of the fitting. Figures 71 and 72 show the fitting detached.

To ensure that the exemplar was leak-free subsequent to its separation from its associated piping, a leak test was performed prior to any other modifications. Nitrogen was supplied to the inlet at 57 psi and the downstream threads were capped. No leaks were detected. Figure 73 shows the test set up.

Since the recovered fitting was discovered in two pieces at 65 Main Street site, the exemplar had to be modified to reflect the current state of the recovered fitting before any more testing could be performed. A modern cutaway provided by Inner-Tite was a useful addition to the drawings in determining the best method of modification. Figures 74 and 75 show the cutaway next to the upstream portion of the recovered fitting.

To simulate the recovered fitting condition, the modification of the exemplar required the mating threads to be cut away without allowing the fitting to relax (i.e., the internal gasket on the exemplar had to remain in the compressed condition since the actual service environment would not allow the two pieces of the recovered fitting to pull apart enough for that gasket to relax completely). To accomplish this, set screws were placed around the circumference of the exemplar fitting, to retain the position of the conical seat within the fitting, Figure 76.

Figures 77 through 81 show the cutting preparation and execution. Figures 82 through 84 show the unattached threaded portion of the fitting being separated after the cutting.

In order to simulate the fixed conditions retaining the transition fitting in service, the exemplar fitting was clamped using a hose clamp on either side of the bracket plate, to preclude the possibility of the inlet 57 psi pressure from completely separating the pieces, Figures 85 and 86. This assembly was attached to the recovered regulator to provide in-service- like conditions downstream of the exemplar. For this test, inlet pressure was 57 psi, downstream pressure was 7 in/H_2O, and downstream flow was 19 CFH (40% on the downstream flow meter gauge).

No leaks were detected with the inlet hose clamped on both sides of the bracket plate. The downstream hose clamp was then removed, which removed the restraint that was preventing the fitting pieces from separating (shown in Figure 86). A slight leak was detected between the brass ring and the steel seat (compression ring). This leak was located at the 12 o'clock (facing the ceiling) position of the assembly. It is very likely that the weight of the bracket, resting unsupported on the hose, was a causative factor in this leak.

Protocol Item N/A: Pull Test of Exemplar Fitting

A pull test to determine the amount of force it takes to pull the plastic inlet hose from the modified fitting was requested and paid for by Dr. Thomas Eagar, one of the interested persons observing the teseting. NSTAR was not charged financially for this test.

The modified exemplar was fixtured into place and an axial tensile load was applied until the plastic hose pulled out of the assembly, Figures 87 through 90. The results of this test were that a load of 85 lb was required to pull the hose from the fitting.

Subsequent to the conclusion of the leak testing of the recovered transition fitting (Protocol Item #9), a pull test was performed on the recovered fitting. The results of this test were that a load of 84 lb was required to pull the hose from the fitting. The original graph resulting from this test is provided in Appendix B.

Protocol Item 7: Flow Test Through MMR #18

A flow test was performed on the upstream portion of the recovered fitting (MMR #18) to determine the flow rate through the tube. The nitrogen tank was plumbed to the upstream and of the tubing of MMR #18, along with a flow meter, Figure 91. Three readings of inlet pressure and flow were taken and are summarized below.

Table VI
Flow Through MMR #18

Inlet Pressure, psi	Flow, %	Flow, CFH
1	15	32.4
5	73.5	158.9
11	100	216.2

Protocol Item 8: Binocular Microscope and Scanning Electron Microscope Examination of Recovered Fitting

Both upstream and downstream portions of the recovered fitting were examined using a binocular microscope. This is a light microscope and enables examination of an object at magnifications up to 50X. Both pieces of the recovered fitting were then examined in a scanning electron microscope (SEM) at much higher magnifications to search for evidence of contact between the two separated fitting pieces. Regions on the surfaces of both pieces, as well as debris collected from them, were examined with a qualitative microchemical analysis technique known as energy dispersive x-ray spectroscopy, or EDS.

This technique (EDS) uses equipment attached to the SEM to reveal the elements present in the analyzed region. The output spectrograms show peaks of various heights that correspond to an element's relative abundance in that region. A large peak means that specific element is common in the analyzed region, and a small peak means an element is more scarce in that region. This protocol item is divided into two subsections encompassing, respectively, the binocular microscope examination and the SEM examinations.

Binocular Microscope Examination

Upstream Portion of Transition Fitting, (MMR #18)

The upstream portion of the recovered fitting (MMR #18) was examined with a binocular microscope. Overall, the metallic portion was covered with a friable layer of corrosion, Figure 92. The male threads of this piece are sporadically visible around the circumference of the downstream side of this fitting portion. These threads are covered in most places with pieces of the female threads from the downstream end of the recovered fitting (MMR #11). This thread arrangement is visible on the radiographs taken of this piece.

The ring made from cupric (copper-containing) material on this fitting portion possessed a shiny, copper-colored region, some white powdery debris, a spot of blue substance, and a circumferential crack containing rust-colored corrosion debris, Figures 93 through 95. This ring was also fractured in spots along the previously mentioned crack.
The black tubing possessed some scuff marks over its length, but only one mark deeper than those surface abrasions. Figure 93 shows a transverse linear mark that cuts into (but not through) the tubing in the stiffener region. This mark contains powdery rust-colored debris and has a halo of white powdery debris at the edges.

Inside the inner diameter (ID) of the stiffener was some white powdery debris, Figure 96. The flat face of the stiffener is deformed in the region of this ID debris; it is pushed down towards the cupric ring.

Possible circumferential machining marks are present on the downstream face of the fitting portion (MMR #18). These are located on the ferrous face visible when looking down the stiffener ID. See Appendix C for a sketch.

The upstream side of this fitting portion, Figure 97, also possessed a friable rust-colored corrosion debris layer, particularly on the ID of the metallic portion where the foundation sleeve was threaded into the fitting.

Due to space constraints and geometry, a portion of the plastic inlet tubing attached to the upstream side of the recovered fitting had to be cut away for the upcoming SEM examination. Figures 98 through 101 show this process as well as the location of the match mark noted on various sketches in appendices to this report.

Also due to space and geometry constraints, debris samples were taken from the upstream portion of the recovered fitting for EDS analysis. The specimen's size and configuration would prevent full and complete microchemical examination of all debris of interest. To facilitate this process, small amounts of various corrosion debris regions were removed from the specimen and placed onto carbon tape. The locations from which these debris samples were taken are shown in Appendix D.

Downstream Portion of Transition Fitting, MMR #11

The downstream portion of the recovered fitting (from MMR #11) was also examined with a binocular microscope. Figures 13, 14, and 15 provide overall views of this fitting portion, along with its attached valve. The notations "125 WOG" and the word "Rockwell" along with a lowercase "r" in a circle are visible on the valve in these figures. The "125 WOG" notation indicates that the maximum service pressure for this valve in water, oil, or gas service is 125 psi. The "Rockwell" notation indicates the manufacturer/brand.

Overall, the outer diameter (OD) of the fitting is rather heavily corroded and covered with a friable corrosion debris layer, Figure 102. No blockages of the fitting or valve were visible. The inner seat surface (i.e. the part with which the stiffener would be in contact were the fitting properly assembled) possessed some light corrosion. No clear evidence of contact with the stiffener face could be seen. It is possible that the light corrosion bloom could be due to fire fighting efforts subsequent to the explosion. The gasket ID exhibits some axial rub marks and possesses sandy-appearing and fibrous debris particles as well as a white deposit in line with the top of the valve (stem side). The downstream end of the gasket possesses some circumferential ripples.

The fitting face, Figure 103, is moderately corroded with sporadic white deposits on the rust-colored corrosion debris. A semi-circumferential line of white debris was also present along the OD of the fitting, at the edge of the face.

As with the upstream portion, size and geometry constraints were factors in the planned SEM examination of the downstream side of the fitting/valve assembly. For this reason, debris was removed from this portion of the fitting as well during its binocular microscope examination. The locations of the removed debris are illustrated in Appendix D.

Scanning Electron Microscope Examination

Both upstream and downstream portions of the recovered fitting were examined with a scanning electron microscope (SEM). The upstream portion (MMR #18) of the recovered fitting was examined for any indications of contact between the two fitting parts. Binocular microscope examination had revealed a small, shiny, brass-colored region on the cupric ring on the downstream end. Since such a region generally possesses less corrosion debris than dull-appearing ones, this was examined in greater detail in the SEM.

Figure 104 shows an overall, or orienting, view of the cupric ring with an arrow pointing to the general region of interest. Arrows and other such marks made on a piece to be examined in a SEM help to locate the regions of interest found during other examinations, as well as decrease the time spent searching for them. Increasing the magnification somewhat in Figure 104 reveals the region at the downstream edge of the cupric ring. Circumferential striations in the shiny region become apparent in Figure 106. The difference in appearance, between the shiny region and adjacent ones that possess more corrosion debris is shown in Figure 107. Figures 108 through 110 show the shiny region in greater detail. For comparison, Figure 111 shows the surface texture and features of a new, never assembled cupric ring. The similarity of these surfaces is apparent. What this means is that there are no obvious signs of contact on the small shiny portion of the surface of the cupric ring on the recovered fitting, since it retains what appear to be the original surface features. An examination of a cutaway of a modern transition fitting provides the reason for this: in the fully assembled condition, the outer downstream edge of this cupric ring stands away slightly from the conical seat. This is a natural position that could occur upon tightening down the two threaded halves of a fitting of this design and is *not* indicative of a lack of contact between the rest of the cupric ring and the conical seat.

Various regions on the upstream portion of the fitting (MMR #18) were also examined with a qualitative microchemical analysis technique known as energy dispersive x-ray spectroscopy, or EDS. This analysis technique is explained at the beginning of this Protocol Item. The results of this analysis on the upstream portion of the recovered fitting are summarized below. Additionally, Figures 109 and 112 through 115 show the regions analyzed using this technique. The regions are labeled 1 through 8 as seen in the figures and on the original spectrograms. The original spectrograms are included in Appendix E for your reference.

Table VII
EDS Results – Upstream Side of Fitting

Location	Elements Present		
	Major	Minor	Trace
1	Calcium	Silicon, Sulfur, Zinc	Magnesium, Aluminum, Potassium, Titanium, Iron, Copper
2	Sulfur	Sodium, Silicon, Calcium, Iron, Copper, Zinc	Magnesium, Aluminum, Potassium, Manganese
3	Copper, Sulfur	Sodium, Silicon, Iron, Zinc	Aluminum, Chlorine, Potassium, Calcium
4	Iron	Sodium, Sulfur, Copper, Zinc	Aluminum, Silicon, Chlorine, Calcium, Manganese
5	Cadmium	Iron	Aluminum, Silicon, Sulfur, Chlorine, Calcium
6	Iron	Calcium	Magnesium, Aluminum, Silicon, Phosphorous, Sulfur, Chlorine, Potassium, Manganese
7	Copper	Sulfur, Zinc	Silicon, Chlorine, Calcium, Iron
8	Calcium	Aluminum, Silicon, Sulfur, Potassium, Iron	Sodium, Magnesium, Titanium, Copper, Zinc

The presence of calcium and iron are expected due to the cement and stone in the cellar wall near which this fitting was located, and the ferrous construction of the majority of the fitting, respectively. The cadmium found in location 5, the stiffener edge, was a common plating material at the time the fitting was manufactured, although the drawings submitted by Inner-Tite do not indicate such plating was applied to this part. Its presence, though, would serve to increase the corrosion resistance of the stiffener.

The presence of sulfur can be explained by the natural gas service the pipes provided. A sulfur-based compound known as mercaptan is a common additive used to give ordorless natural gas its "rotten eggs" scent.

Since the majority of the locations analyzed on this side of the fitting were located on the cupric ring, the presence of copper and zinc are expected and indicate a brass alloy.

Chlorine was present in trace amounts in several locations. This element can form ions and compounds that are aggressive to ferrous metals and copper alloys. The source of this chlorine could be runoff from paved areas where de-icing salts were used. Rain carries these into the soil where the runoff could enter the basement via the service line channel. It must be noted, however, that the relative amounts of chlorine detected here are small and could have other sources. Peaks such as this have been found on items handled by humans. While the recovered items have been handled with gloves while in custody of MMR, the possibility that the chlorine traces seen here originated with prior ungloved handling must be considered. A third possible source is residue from the fire fighting water, which may have had a municipal supply source.

Due to the severe amount of outgassing from the sample, a decision was made not to utilize the Light Element mode of EDS analysis on the fitting portion itself. Outgassing occurs when gases and water vapor or other volatile substances are trapped in pores of a product. The loose, friable corrosion debris of both ends of the recovered fitting provided a perfect environment to trap residual natural gas, moisture, etc. A SEM can be damaged by severe outgassing from samples. Therefore, both Standard Mode and Light Element Mode were used on the debris collected from the fitting. This eliminated the severe outgassing situation while enabling a full characterization of the elements present in the debris, including the lower atomic weight ones (i.e., oxygen, carbon, etc.) to which the Light Element Mode is more sensitive. Figure 116 shows the debris whose results are summarized below.

Table VIII
EDS Results – Upstream Side Collected Debris

Location	Elements Present		
	Major	Minor	Trace
A	Carbon*	Aluminum, Sulfur, Calcium	Oxygen, Magnesium, Aluminum, Silicon
B	Carbon, Silicon	Oxygen, Aluminum, Calcium, Iron	Sodium, Magnesium, Phosphorous, Sulfur, Chlorine, Potassium
C	Oxygen, Calcium	Carbon, Aluminum, Silicon, Sulfur, Titanium	Sodium, Magnesium, Phosphorous, Potassium, Iron, Zinc
D	Oxygen, Iron	----	Carbon, Aluminum, Silicon, Sulfur, Chlorine, Calcium, Manganese

Table VIII (continued)
EDS Results – Upstream Side Collected Debris

Location	Elements Present		
	Major	Minor	Trace
E	Oxygen, Iron	Carbon, Aluminum, Silicon, Sulfur, Calcium	Sodium, Magnesium, Phosphorous, Chlorine, Potassium
F	Oxygen, Iron	Silicon, Sulfur, Calcium, Chlorine	Sodium, Magnesium, Aluminum, Phosphorous, Potassium, Manganese
G	Oxygen, Iron	----	Carbon, Sodium, Aluminum, Silicon, Phosphorous, Sulfur, Calcium, Manganese, Copper, Zinc
H	Oxygen, Calcium	Carbon	Aluminum, Silicon, Phosphorous, Sodium, Magnesium, Sulfur, Potassium, Iron

*Carbon reading artificially high due to interference from the carbon tape mounting material (black strip shown in Figure 116).

These results show the debris to consist mainly of iron and oxygen, calcium and oxygen, or silicon and oxygen. Common rust, cement compounds, and sand particles, respectively, generally produce similar spectra.

Trace amounts of chlorine are also present in several instances. The one occurrence of a larger peak of chlorine (Location F), is significant because this chip of debris was taken from the fitting OD (see Appendix D for debris locations and Appendix F for original spectrograms). This peak is much larger than the trace-sized peaks exhibited by the rest of the debris and by the direct readings from the fitting (Table V and Appendix E) and much larger, also, than chlorine peaks typically produced by human handling. Such a peak from OD debris is unlikely the result of the fire fighting water, too, as that would leave similar amounts of chlorine present over all the surfaces analyzed. This peak, then, indicates that a chlorine source other than handling and fire fighting water contributed to the corrosion seen on the fitting OD. The saline runoff water theory is the most likely of the three proposed, given this result.

The downstream end of the recovered fitting (MMR #11) was also examined in the SEM for any indications of contact between the two fitting portions. The two regions available for this examination were the face (i.e. the flat portion of the fitting that would butt up against the upstream portion in service) and the tapered region leading from the face into the ID and abutting the interior gasket. Only about a third of this taper was available for SEM examination due to size and configuration of the fitting/valve assembly.

Even with this limited opportunity for examination, indications of contact could be seen. Figures 117 through 119 show an abrasion made by an object moving away from the fitting (i.e. in the same manner as two objects being pulled apart). Adjacent to this abrasion is a flattened-appearing region, Figure 120, similar to what is produced when two objects press against one another. Figure 121 shows another flattened region at the interface between the taper and the gasket. These regions all indicate the one-time presence of a mating body.

While the fitting/valve assembly was under examination in the SEM, EDS, analysis was performed on various accessible regions. These analyses were performed in standard mode only for the same reasons explained in the upstream portion description. Figures 122 through 125 show the regions A through H analyzed in this manner. The results of these analyses are summarized below and the original spectrograms are included in Appendix G.

Table IX
EDS Results – Downstream Side of Fitting

Location	Elements Present		
	Major	Minor	Trace
A	Silicon	Aluminum, Iron	Magnesium, Sulfur, Chlorine, Potassium, Calcium, Titanium, Manganese
B	Iron	Silicon	Magnesium, Aluminum, Sulfur, Chlorine, Calcium, Manganese
C	Sulfur, Calcium	---	Aluminum, Silicon, Phosphorous, Iron
D	Iron	Silicon	Aluminum, Phosphorous, Sulfur, Chlorine, Potassium, Calcium, Manganese
E	Silicon	----	Aluminum, Potassium, Calcium, Iron
F	Iron	Silicon	Aluminum, Sulfur, Calcium, Manganese
G	Iron	Silicon	Aluminum, Phosphorous, Sulfur, Potassium, Calcium, Manganese
H	Iron	Aluminum, Silicon, Sulfur, Chlorine, Calcium	Sodium, Magnesium, Phosphorous, Potassium, Titanium, Manganese, Zinc

Again, silicon, calcium, and iron are expected on a ferrous fitting exposed to soil and cement. Chlorine is again present in minor to trace amounts on the face and OD.

Debris was collected from this downstream portion of the fitting and was analyzed by EDS in both Standard and Light Element Modes. The results from this analysis are summarized below. Figures 126 and 127 show the debris analyzed, as-placed on carbon tape. The original spectrograms are located in Appendix H.